ELECTRICAL REVIEW

17th JULY, 1953

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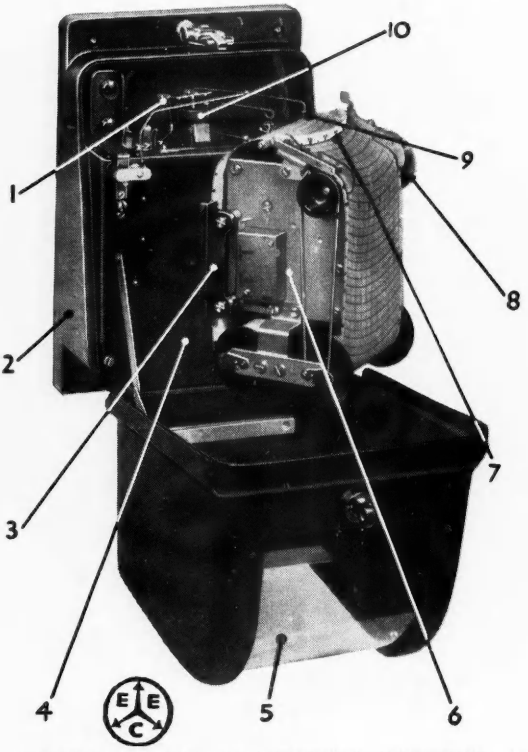

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ELECTRICAL REVIEW

17th JULY, 1953

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872 • VOL. 153 • NO. 3

Rural Electrification

THE recent announcement by Mr. Geoffrey Lloyd, Minister of Fuel and Power, of an additional capital expenditure on rural electrical development work during the ensuing year, making about £7·5 million available, will not, it is hoped, be taken by the public, especially those in country districts, as implying that the problem of supplying rural areas has been solved and that soon anyone wanting electricity can have it for the asking.

When it is realized that the £7·5 million has to be divided among the whole of the Electricity Boards the amount available for any particular area or scheme cannot be very large. Mr. S. F. Steward, chairman of the South Western Electricity Board, stated at the British Electrical Power Convention at Torquay that it would cost £17 million to electrify completely the rural areas in the South West alone. The extra money now to be made available, though roughly representing all the Boards have asked for, in fact does little more than make possible resumption of rural development work on a scale comparable with that undertaken before the last of the Government's restrictions on capital expenditure two or three years ago.

Apart from considerations of the scope of the developments now made possible, it must not be thought that schemes can be undertaken overnight, so to speak. True, the Electricity Boards in anticipation of better conditions have prepared plans for extending their supplies but almost certainly there are still wayleaves and other such matters to be settled. Also some prospective consumers, anxious though they may be to obtain supplies, are reluctant to "sign up" in the belief that once the supply is in the neighbourhood they will be connected more cheaply. The question of Electricity Board personnel also enters into the matter. During the past years of restricted development not only has the number of sales promotional staff been allowed to dwindle but also to some extent the technique of selling has been lost. This applies particularly in

relation to domestic apparatus, the restrictions on advertising of which have just been relaxed, and is of special importance to future development work since it is for the services electricity can perform in their homes that not only ordinary householders but many farmers as well first want supplies.

SECOND THOUGHTS

When the United States Army authorities decided to ignore the original tenders for plant for the Chief Joseph Dam (the lowest being that of the English Electric Co.) and called for new offers, enabling an American company to underbid the English Electric Co., we said that such a practice was "unusual in this country." Certainly we never imagined that we should soon have to record in this country what seems to us a most regrettable procedure on the part of the Belfast Corporation Electricity Committee as reported in our last issue. The Committee, having virtually placed orders for power station plant with certain makers at stated prices (after inviting offers from a number of companies), suddenly rescinded this decision and is now to advertise for tenders. We can find no excuse for the Committee's "second thoughts" on the grounds that it may not have followed normal procedure, nor does the receipt of a letter from another concern offering lower prices seem to us to provide any reason for adopting a practice which, if it should spread, would undermine confidence in every commercial transaction.

FUEL "FACTS"

While the Electricity Boards are complaining about the meagre return from some of the beneficiaries of rural electrification along comes Mr. Eric Bellingham, director-general of the Coal Utilization Council, to suggest in the *Financial Times* that the Boards are forcing rural consumers to use electricity for cooking, "in spite of their preference for heat storage coolers which operate continuously on solid fuel." Having belauded these appliances, Mr. Bellingham says:—

> "All who believe in a balanced fuel policy must welcome increased electrification, but with the proviso that it must not mean the enforced and uneconomic displacement of solid fuel."

As such displacement is neither enforced nor uneconomic we wonder why Mr. Bellingham wrote this letter.

NUCLEAR RESEARCH

Preliminary tests of the proton synchrotron at Birmingham University give promise that the machine when in full operation will contribute materially to knowledge of the mechanism of the atomic nucleus. It is also expected to reproduce in the laboratory certain aspects of cosmic radiation. The synchrotron differs from the earlier cyclotron mainly in that the frequency of the applied voltage is varied as the energy of the protons increases. The speed of the protons will thus be accelerated on a fixed radius to reach 90 per cent of the speed of light (186,000 miles/sec), giving them an energy equivalent of 1,000 million volts.

AGRICULTURAL DISPLAYS

Complaints were made at a meeting of the South Western Electricity Consultative Council of the elaborate nature of the South Western Electricity Board's display at the recent Devon County Show. No doubt similar criticisms could be made of the stands of other Boards at other agricultural shows, but would they be justified? To make their rural developments remunerative the Boards must encourage the full use of their service, and displays at these shows, which are great events among the rural community, are an excellent way of doing this. And if participation is worth while it would be foolish merely to stage a dreary collection of apparatus.

Joint Heat-Electricity Generation

By G. K. ALSTON, B.Sc.(Eng.), M.I.E.E.*

A Case for the Diversion of Generating Plant

IT is probably fair to say that if the generation of electricity had been developed only in association with, and as a by-product of, the generation of heat for specific purposes, the use of the condenser as an adjunct to the steam turbine would now be severely frowned upon as a means for increasing the quantity of electricity to be generated. We have become inured to the dreadful waste of heat at the condenser only because of the sequence of development of the steam engine. Power requirements came first and heat requirements, served from a central source, followed. Had these been reversed in order, it is improbable that we should now be using 37 million tons of coal a year in public central power stations, solely for the generation of electricity, and throwing away as useless heat from no less than 20 million tons of this annual quantity. By 1965 the annual fuel consumption in central power stations will be in the region of 72 million tons of which, making allowance for improvements in efficiency, at least 36 million tons will be wasted at the condenser.

The advocates of district heating, served by modified existing stations and future electricity generating stations designed for the purpose, find little support and a good deal of apathy and downright opposition in some quarters. That difficulties exist is unquestionable, and that some proportion of wasteful generation of electricity will need to remain must also be accepted, but making full allowance for all these, the condenser heat loss equivalent to 36 million tons of coal in 1965 could certainly be cut by half. This would necessitate a great deal of pioneering work to overcome the existing difficulties, of which prejudice is not the least. There is, however, a somewhat indirect and partial remedy which can be applied outside central power stations and which is already in wide use—the combined generation of heat and electricity in industry.

General industry (textiles, chemicals, engineering, etc.) is at present using about 44 million tons of coal annually, mainly for

* Chief Engineer, Jas. Williamson & Son, Ltd., Lune Mills, Lancaster.

The electricity generating plant capacity of this heat-electricity power station is 7,000 kW

The large cylindrical vessel is the essential feature of the thermal storage boiler feed water preheating system

low grade heating (i.e., temperatures below 240 deg F). It is reasonable to say that at least half of this could be used for the generation of electricity as a " by-product " without any increased fuel consumption in industry (using more efficient boilers). This would provide 4,400 MW of new generating capacity leading to an annual saving in fuel in central electricity stations of 10 million tons and some £600 million worth of new central power station plant. This capital saving alone would pay for the new industrial power stations, so that the saving of 10 million tons of coal per annum would be at no overall capital cost. How to divert the capital from public supply to industry presents a problem to which reference will be made later.

The National Coal Board is investing capital at the rate of over £10 million for every additional million tons of coal yearly it plans to mine. The saving in fuel of 10 million tons per annum by means of industrial heat-electricity generation would, therefore, save some £100 million worth of investment in the mining industry. Thus, on the one hand, we might put in 4,400 MW of industrial heat-electricity generating plant and save £100 million or, on the other hand, continue our present policy of building central condensing power stations and have to invest £100 million extra in the mining industry for the coal these stations will use (or, more correctly, waste). These figures are not exact because they are not based on precise information, but it is unquestionable that large savings can be made and, in addition, our coal reserves conserved substantially.

If £600 million worth of generating plant is to be provided for industry, how is it to be financed? The annual saving to be reaped by industry through not purchasing some 17×10^9 kWh from the Electricity Boards would be about £58 million. Annual capital charges on £600 million would, however, be not more than £48 million, hence the net saving to industry becomes £10 million. Taxation would cut this small saving into half. Can industry be expected to invest large capital sums, such as £600 million, with the prospect of no more than $1\frac{3}{4}$ per cent return? Such a proposition is, of course, ridiculous. The only condition under which the installation of industrial heat-electricity generating plant becomes economical is when new boiler plant is needed to replace old plant or for factory extensions. Even then, the extra cost of providing the electrical end of the generating plant results in only a poor financial return.

What, then, are we to do? Go on, as a nation, spending huge capital sums on condensing plant and further huge sums on coal for it to waste, or divert the capital to industrial stations and save the coal? Since, on the earlier showing, the latter alternative would conserve the nation's fuel and capital resources to the extent of 10 million tons yearly and £100 million, the answer seems obvious.

The Government has agreed that public supply generating plant may be increased by the British Electricity Authority at the rate of 1,500 MW annually. At present costs, including transmission and distribution, the annual sum involved is about £200 million. Some of this capital should be diverted to industry, on terms similar to those applying to the British Electricity Authority, and the rate of diversion should be increased until by, say, 1956, it had reached £60 or £70 million per annum. This would enable some 500 MW of industrial plant to be commissioned annually and the British Electricity Authority figure would be reduced correspondingly from 1 500 to 1,000 MW annually.

A wealth of data exists for the design of heat-electric industrial power plants, based on the many plants now working, but such information unfortunately is not co-ordinated. Ultimate economy would

result if certain broad standards for industrial plant were drawn up. These should be based on present experience, after its co-ordination, continuing general designs and methods that have proved sound. No one section of industry can be expected to carry out the co-ordination and standardization and, if it is to be done, clearly some body under the Ministry of Fuel and Power will need to be set up for the purpose. This is the right approach since the capital saving and economy in fuel that can be achieved is directly within the purview of this Ministry, as also will be the diversion of capital needed for the building of the industrial power stations. The amount of work to be done by what we might call an industrial power plant board would be considerable and could not be short cut, but for the better consideration of this proposition some attempt will be made to outline the arrangements that might come into being.

The first step would be to collect information from existing heat-electric plants and from it to establish the best types and sizes of plant to give an optimum combination of efficiency, reliability, simplicity and economy. A few suitably qualified engineers, given full and friendly access to the principal heat-electric plants of the country, would be able to collect and co-ordinate this information within a period of twelve months. Their aim would be to lay down a set of standards for boilers, turbo-generators and ancillary plant. The standards might well be as follows:—

Boilers.—Four capacities of 5,000, 20,000, 40,000 and 60,000 lb/hr; four pressures of 200, 450, 650 and 950 lb/sq in; and a flexible range of steam temperatures to suit back pressure conditions.

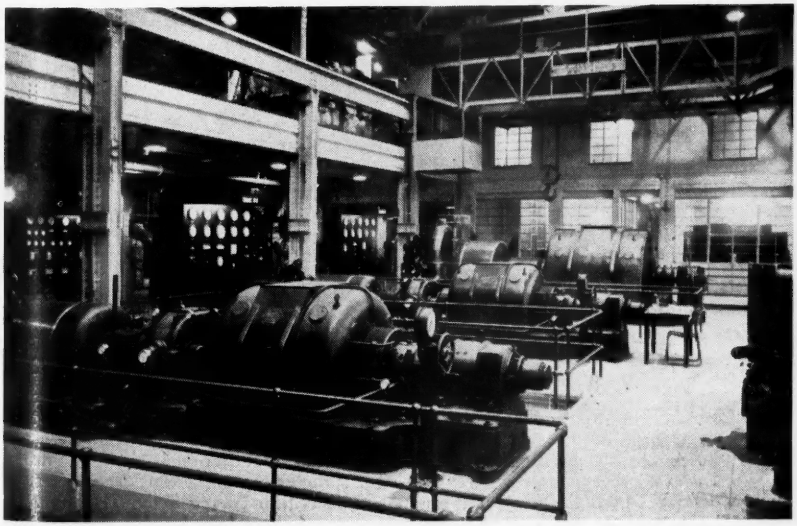
Turbines or engines.—Six capacities of 5,000, 10,000, 20,000, 40,000, 60,000 and 80,000 lb/hr flow; four inlet pressures of 180, 400, 600 and 900 lb/sq in; all these should be suitable for accommodating sufficient stages of pressure reduction to 40 lb/sq in exhaust.

Alternators and induction generators.—A limited number of sizes at 6·6 kV and 415 V, 3 phase, 50 c/s, to provide a range of machines to match power outputs of the above turbines and engines.

Ancillary plant.—Water treatment plants for 5,000, 15,000, 25,000 and 50,000 lb/hr make-up; de-aerators and boiler feed pumps for 20,000, 50,000, 100,000 and 200,000 lb/hr and pressures to suit the above boilers.

Further data covering condensate collection, feed heating, switchgear, etc., would

Some of the turbo-alternator plant; two 500 kW condensing sets and one of the two 3,000 kW back pressure sets



The firing aisle between unpartitioned boiler and turbine houses

also be available and would probably lead to the preparation of useful standards or codes of practice to cover their design and use.

Concurrent with the foregoing investigation, a second team of suitably qualified engineers should survey, by sponsored invitation, all industries, other than those which already possess adequate heat-electric plants, with a heating demand equivalent to 20,000 lb of steam per hour and over. Smaller heat users could be dealt with later. Co-ordination between the two teams, as the surveys were proceeding, would enable preliminary plans to be drawn up which would provide helpful guidance to both teams in formulating final plans and in seeking out the correct information for such plans.

By including on the industrial power plant board representatives of the leading power plant manufacturers, arrangements could probably be made for individual manufacturers each to specialize in one size of unit. Once the scheme for the installation of industrial plant was well under way bulk orders could be placed for plant and, to a certain extent, manufacturers could proceed to meet "off the shelf" orders.

Effective co-operation would be very necessary between the proposed organization and the British Electricity Authority and Area Boards, and to this end the Ministry of Fuel and Power would need to issue the necessary directives. In many cases industries would be able to carry the whole or greater part of their electrical load in winter, but not in summer, and in this instance in particular, the present attitude of the Electricity Boards would need to be modified and supplies of energy would need to be provided at the right cost.

Similarly, but in reverse, the Electricity Boards would need to accept surplus energy from industry during the winter and make proper payment for it. In some cases, where a number of industrial heat loads exist in a compact area, it would be most economical to provide "central" stations to serve their heat-electricity demands and such stations would probably need to be operated by the British Electricity Authority.

So much for the general arrangements for furthering industrial heat-electric generation. Sceptics will say that it isn't practicable and, in an endeavour to counter such views, a simple scheme, typical of many thousands that could be applied, will be outlined.

There are 160,000 industrial consumers supplied by the Electricity Boards and they consume 25×10^9 kWh annually, an average of, say, 150,000 kWh per consumer. Averaging out over these same consumers the 44 million tons of coal used by general industry, we have an average consumption of 300 tons per annum, concentrated in cases where only space heating is used to, say, 10 tons per week over 30 winter weeks each year and 50 hours per week. This rate of fuel consumption would readily permit 100 kW to be generated from a back pressure engine, giving a total of 150,000 kWh over the 30 winter weeks at 50 hours per week. The quantity of electricity generated would thus equal, in 30 weeks, the average amount taken for a whole year by one of the "average" consumers on the systems of the Electricity Boards. Some part of the energy generated in the 30 winter weeks would be exported and the total quantity exported would very roughly balance the amount imported during the summer months and at other times.

This outline is very sketchy, but it at least

represents "average" conditions that can be repeated in many thousands of industrial establishments. It involves no elaborate plant, though a good deal of ingenuity can be applied to designing such plants, on simple lines, that will require little skilled attention. Here the data collected and the sum total of experience put together by a team of engineers visiting existing plants would prove invaluable.

It has been assumed throughout that parallel running with the public supply system would be essential to the good working of industrial heat-electric schemes. In the case of small plants this would be simple, particularly if induction generators were used. Larger schemes would present more problems, though none of these need be regarded as serious, and all would be readily capable of solution as is shown by a number of such plants which have been working for many years in parallel with the public supply systems. In fact, it can be said that the running of a medium to large industrial power station in parallel with the grid is one of the lesser problems that have to be faced in operating such plant. Such a station is almost certain to include more than one alternator set, hence reliable means of synchronizing need to be provided, and these can serve equally well for coupling the station with the public supply system. A point here, however, is that a simple lamp synchroscope should be included additional to and as a check on the rotary synchroscope. If the latter went out of action owing to the failure of control circuit fuses, relays or other equipment, the lamps would be a great help in emergency and a comforting check on the rotary synchroscope when it had been made to function again.

Neutral earthing, independent voltage adjustment and the limiting of fault current to moderate values on the industrial system could be all nicely dealt with by coupling the industrial station to the public supply through an even ratio dual wound transformer.

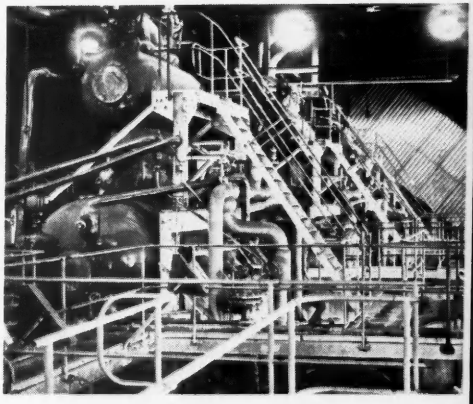
The Electricity Boards would be likely to object to the earthing of star points on the alternators in an industrial station when these alternators were running in parallel with their systems. It would be undesirable, however, that these machines should remain unearthed if the station became separated from the public supply. Under present conditions of load shedding by voltage reduction, the industrial system has to suffer the nuisance and loss of efficiency that this involves, unless means are provided for the adjustment of the industrial voltage independent of the public supply.

The fault current associated with the amount of generating plant required for even a large industrial establishment is usually considerably less than that of the Electricity Board's system, and means for limiting the maximum fault current on the industrial system would be desirable in order to economize in the cost of switchgear.

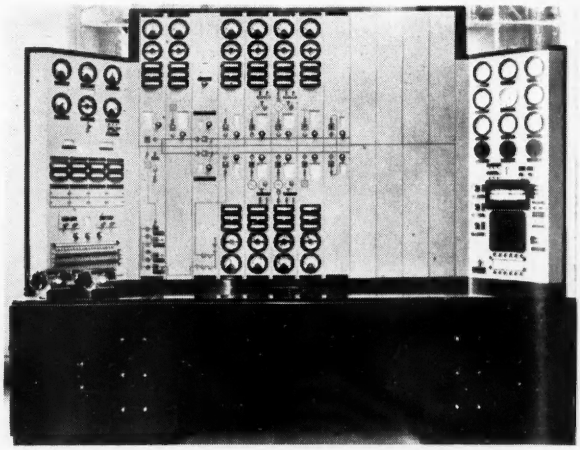
All three of the foregoing points would be well covered by using the coupling transformer with an earthed star point on the industrial station side, on-load tap changing and impedance to suit the maximum value of fault current fixed for the industrial system.

Before leaving the question of synchronizing, it is necessary to draw attention to the need to see that any switching points existing between the industry's power plant and the Area Board's supply point should be so protected and safeguarded that in the event of any switch opening accidentally or under fault conditions, such switches should not be closed until after the link had been severed at the industrial power station end where synchronizing equipment existed. On account of this it would be most advisable to have a private telephone link between the Area Board's supply point and the industrial power station. Such a link would be also of great value at other

The overall heat-electricity requirements are met by four 40,000 lb/hr boilers



times in maintaining proper contact between the industrial power station staff and the public supply staff, for although it might be in the Electricity Board's area, it might not actually be on the Board's property, but at a local station of the British Electricity Authority, through the switchgear of which the link to the industrial power plant might be made.



The station control board

Frequency variation in public supply must be accepted, but, of course, should variations become extremely irksome, and if the industrial power station had sufficient plant to cover its demands, it could be isolated from the public supply system and run at normal frequency. In practice this would be unlikely to be necessary, though on isolated occasions such as the rapid dropping and taking up of load (for the two minutes silence, for instance) independent running might be justified. Surges on the public supply system would make their effect felt on the industrial station's system, but the coupling transformer of appropriate impedance would be a means of minimizing these effects.

In the early stages of planning an industrial power station it is necessary to collaborate closely with the Electricity Board, and one of the first points that would need to be settled would be the maximum amount of power the industrial system would be likely to need at any time, and also the maximum amount of power the industrial system would be likely to be able to export. In most cases a power link would already exist between the public supply and the industry of more than adequate strength to carry the future loads to be interchanged. Frequently the link might be several times heavier than is necessary, and in such circumstances the Electricity Board would wish to appropriate some of the feeding capacity for other electrical demands, unless some special financial agreement were reached under which the industry reserved for its exclusive use the whole of the feeding capacity against possible emergencies.

In order to arrive at sound decisions on these matters, it would be necessary for the industry carefully to decide what loss it would suffer in the event of an entire interruption of supply for a period of, say, one hour. The value of this potential loss would need to be balanced against the cost of maintaining adequate stand-by supply capacity to meet all needs. On the one hand, payments the industry would have to make to the Board annually for such stand-by feeder capacity would be a certainty and would occur year after year, whereas the entire failure of supply to the industrial system would be only an infrequent possibility. In most cases the tendency would be to " play safe " over the first period of operation, say five years, and thereafter to base future agreements with the Electricity Board on the experience gained.

In many cases the retained feeder capacity and quantity of power catered for in the agreement would be less than the total power demand of the industry. This would mean that suitable care would have to be taken to prevent the demand on the public mains exceeding the available supply capacity and the load for which protective equipment was set on the incoming feeder or feeders. This particular aspect of the general problem of parallel running would

warrant careful thought early in the planning of the new industrial station because it would very much govern the size and number of units of generating plant that should be installed.

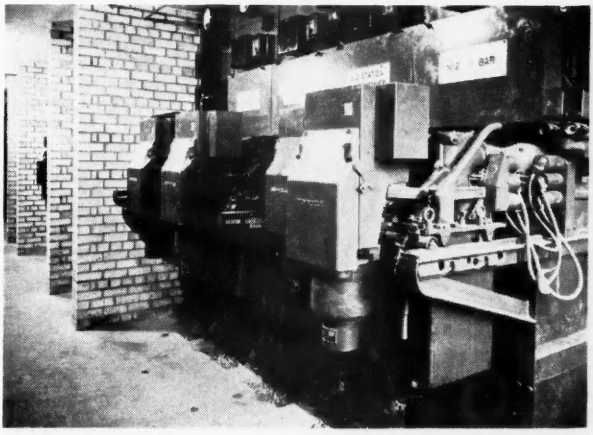
To quote an instance: the industry might have a maximum power requirement of 5,000 kW, and it might have steam loads such as to justify the installation of two 3,000 kW back pressure sets. It might then be decided that a stand-by supply of 2,000 kW would be desirable. Under such an arrangement the feeder maintained by the Electricity Board would possibly have its protective equipment set to trip at a sustained load of 2,500 kVA which, with an import of 2,000 kW, might very readily be exceeded if the power factor should be low.

Let us suppose that the industrial system would be carrying a load of 5,000 kW with both back pressure sets running, each carrying 2,500 kW, and that the industrial station would be floating on the grid, i.e., not importing or exporting. Let us then suppose that a mishap occurred, causing one of the back pressure sets to trip out. The other back pressure set would pick up some of the load, though by far the greater part would be taken by the Electricity Board's feeder, to a figure which would probably exceed 2,500 kVA. This would cause the Electricity Board's feeder to trip, leaving the one back pressure set still on the bars to carry the whole of the load, and this in turn would trip out. Under conditions such as this the stand-by supply would fail to be a real stand-by in an emergency, and it would be obviously desirable to adopt some procedure which would prevent such eventualities. A shut-down of this kind could quite well be prolonged because station auxiliaries would be lost, and it would be necessary to make a completely fresh start-up of the industrial plant, though the public supply here would be a great help and would be the first to be re-established.

The foregoing kind of trouble could probably be avoided by arranging inter-tripping between certain generator switches and the public supply feeder switch on the one hand, and the outgoing feeder switches to the industry's loads on the other hand. The outgoing feeders would be selected so that those to trip first would be the least essential and the more vital loads would be independent of such tripping arrangements, with the hope that a sufficient quantity of plant would always be maintained on the busbars to keep such supplies fed. The extent to which precautions of this kind were taken would depend entirely on how vital continuity of supply was in the industry concerned, and in very many cases it would be found that no elaborate precautions would be justified.

Quite apart from what has already been said, it will be apparent that power factors would need to be carefully watched and controlled, and in particular the power factor of the demand on the Electricity Board's supply. This would be readily catered for if the industrial station were provided with a control room similar to, but a miniature of, a typical British Electricity Authority station. Such a control room would be justified because of the number of variables that would need to be watched, covering not only electrical demands, but also heat demands. The capital cost of providing a control room and the cost of suitably staffing it would

The station main h.v. switchgear



be repaid many times over by the economies that would result from its provision. For instance, some control over the pressure of steam fed to the factory for process purposes would enable the control engineer to vary the quantity of electricity he would be generating, and to take full advantage of conditions in the factory permitting reduced steam pressures. If he had a number of generators under his control he could also watch the efficient loading of these machines, and so arrange import from, or export to, the public supply to the most economic advantage of the plant as a whole.

From the foregoing it must not be assumed that the difficulties to be met present any serious problem. They are, however, all points worthy of note, and where circumstances make it desirable, they should be appropriately catered for early in the design of any new scheme. The surveys recommended earlier in this article would bring to light, no doubt, other points needing careful study, and over a period of a few years, a central authority such as the suggested industrial power plant board, with all the help that industry could give it, plus assistance from consultants already well experienced in this kind of work, would amass a wealth of really valuable information and designs, many of them well-tried in practice, which would be of immense benefit to the nation as a whole.

The important thing to be borne in mind is that much of the fuel now used in industry could be used more efficiently to generate electricity as a by-product, and that the overall cost of doing this would be no greater than the cost of laying down new central power stations to meet the same volume of electrical demand. Furthermore, fuel resources would be conserved to the extent of 10 million tons per annum, and capital investment in the mines amounting to £100 million would be saved. Alternatively, of course, the same sum could be invested to increase the output of the mines and the coal used for export purposes. This would be of immense benefit to our overseas trading position and would certainly be a very much better investment than £100 million spent on plant to raise coal to be wasted in central condensing power stations.

The foregoing programme would be the beginning of a full-scale national drive to really conserve our fuel resources. The development of district heating and railway electrification would be further steps to be planned in the very near future.

The illustrations in this article all relate to the heat-electricity generating station operated by the author's company, Jas. Williamson & Son, Ltd., Lancaster. The station operates with an overall thermal efficiency of 70 per cent, and since its commissioning in 1949 it has achieved a fuel saving of 20,000 tons of coal per annum.

An Australian Surplus?

By Our Sydney Correspondent

THOSE people in Australia who are in a position to sum up the future of the country's power supply have lately realized that an extraordinary position has arisen. Despite serious power shortages, zoning and regular power cuts affecting both industrial and domestic consumers, there is the possibility of an electricity surplus in 1958 if costs continue to rise.

Consumption has more than doubled since before the war, and to meet this increase ambitious plans have been adopted in every State for the construction of new and bigger power stations. By June the aggregate generating capacity had reached 2,400,000 kW and the expansion is still in full swing. New South Wales alone plans to increase capacity to very nearly as much as this. Every other State is also pushing ahead as fast as it can, so that by 1958 their combined capacity is expected to be 4,900,000 kW, mostly thermal. On top of all this, the first sections of the gigantic Snowy Mountains project are expected to be available, bringing the theoretical capacity of Australia to 5,300,000 kW.

Most State planning has been based on the assumption that demand will increase annually by from 8 to 10 per cent. The planners are bound to disregard small year-to-year variations, because they have to prepare their schemes ten or fifteen years ahead. There is no doubt about the potential growth in the use of electricity in Australia. Population and industrial development are both progressing rapidly, and these factors are multiplied by the steady increase in the use of electrical equipment in factory, farm and home. Cheap electricity will always find users, but if charges continue to be increased much above the present levels there is little doubt that a contraction of demand will result. There must be some misgivings over the New South Wales plan to spend £70 million over the next five years, but this is overshadowed by the Snowy Mountains scheme, which is taking £14 million this year and is now expected to cost £550 million when it is finished in 1958 or thereabouts.

Industrial Electronics

Review of Eighth Manchester Exhibition

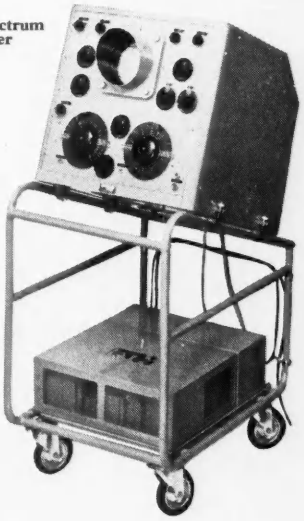
THE eighth annual exhibition of electronic apparatus to be organized by the North-West Branch of the Institution of Electronics is being held at the College of Technology, Sackville Street, Manchester, 1 (15th to 21st July). The show was officially opened on Wednesday last by Sir Geoffrey Jefferson, C.B.E., F.R.S., Emeritus Professor of Neuro-Surgery, University of Manchester. It is in two sections: a scientific and industrial research section composed of displays by the universities, hospitals, etc., and a commercial section devoted to manufacturers' products which includes displays by more than 50 firms.

In the research section the principles of colour television are being demonstrated by Ferranti, Ltd. This company also has on view a range of stroboscopic lamps, a flying-spot scanning tube and various special-purpose valves. Television transmitting and receiving equipment made by members of the Television Society is also shown; it includes a 405-line closed circuit television camera and transmitter which is arranged so that visitors appearing before the camera can see themselves on the screen of the receiver.

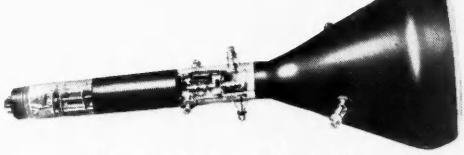
Radio transmitters and receivers constructed by members of the Radio Society of Great Britain include a fully operating radio station, while the general practices in electro-acoustics are explained by the British Sound Recording Association. The G.P.O. has on view a spectrum analyser designed by the Radio Experimental and Development Branch to facilitate detailed studies of the spectra emitted by radio transmitters.

A large portion of the research section is devoted to the medical applications of electronics. Here the exhibit of the Christie Hospital and Holt Radium Institute explains the scientific background behind some of the electro-medical treatments, particularly those using X-rays and radioactive isotopes. Radioactive sources in which the isotope is firmly bonded within metallic silver so that it cannot be released accidentally, are shown by the Radiochemical Centre. The University of Leeds Department of Medical Physics has a number of items on view including a two-channel electro-myograph of unit construction, a balanced pre-amplifier for use with a standard electro-cardiograph, and an experimental accelerometer for heart-sound recording.

The University of London Post-Graduate



G.P.O. spectrum analyser



Ferranti flying-spot scanning tube

Medical School exhibits a machine which duplicates the functions of the human heart in pumping blood. This equipment has wide applications in resuscitation and in special treatments where large scale blood transfusion is involved as well as opening the way to new surgical technique especially in heart and lung operations.

Another interesting item is an electronic field plotter shown by the University of Manchester. In this equipment use is made of the fact that the secondary emission current from the screen of a cathode ray tube depends on the screen potential to obtain a picture of the electrostatic field set up on the screen when it is used as an electrolytic tank.

In the commercial section of the show several exhibitors are displaying electro-medical apparatus. For example, the display of Marconi Instruments, Ltd., includes a radiographic and fluoroscopic X-ray generator, a 30 mA mobile X-ray unit, deep therapy apparatus and an electro-encephalograph.

The main exhibit of Cinema-Television, Ltd., is a flying-spot microscope. This is a combination of an ordinary optical microscope and a flying-spot scanner, which traverses the object on the slide. The light passing through the slide is collected by a multiplier photo-cell, the tube signal being amplified and used to modulate a 12in cathode ray tube. On the stand of R.C.A. Photophone, Ltd., is a permanent magnet table model electron microscope which fulfils the need for a compact instrument of simplified construction. It has a resolution of 100Å.

R.C.A. electron microscope

Phenomena of general scientific interest are constantly encountered in laboratories working with electric arc discharges through rare gases and vapours. A number of such effects are demonstrated as they occur in either commercially made devices or specially constructed discharge tubes by Siemens Electric Lamps & Supplies, Ltd.

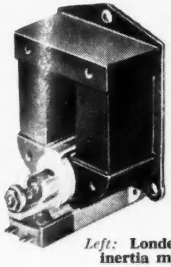
An interesting feature of the display by Electro-Methods, Ltd., is a range of low inertia integrating motors which are proving successful as dosemeters in applications developed by the Physics Department, Royal Cancer Hospital, and also by the Christie Hospital in Manchester. These d.c. machines are so sensitive that they can be operated directly by a photo-cell or thermocouple.

Apart from "SenTerCel" selenium rectifiers and "Thermistors," Standard Telephones & Cables, Ltd., has on show a portable psophometer, a pulse echo fault locator and an industrial high-speed electronic counter.

Perhaps the most comprehensive stand in the show is that of F. C. Robinson & Partners, Ltd., on which the equipment of many manufacturers is shown. Those represented include H. & J. Leak, Ltd., Mullard, Ltd., A. C. Cossor, Ltd., Measuring Instruments (Pullin), Ltd., Waveforms, Ltd., and Advance Components, Ltd.

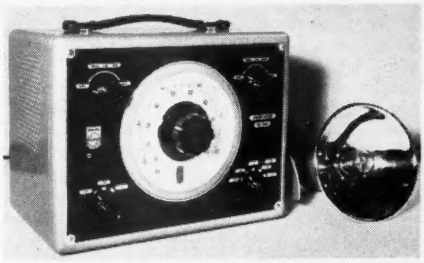
A comprehensive collection of "Avo" multi-range instruments, valve testers, etc., is shown by the Automatic Coil Winder & Electrical Equipment Co., Ltd., and Dawe Instruments, Ltd., has an ultrasonic thickness gauge, a sound level meter, vibration meters and stroboscopes.

Fielden (Electronics), Ltd., exhibits an electronic resistance thermometer, a servo-operated, self-balancing Wheatstone bridge instrument, one arm of the bridge being formed by a Sangamo Weston platinum resistance bulb which forms the temperature sensitive element. Various ranges are available between −200 deg and +500 deg C. A high-speed electronic counter exhibited for the first time by Instruments & Controls (J.L. Record), Ltd., was originally developed for the carton manufacturing trade, and is used for recording the output of high-speed gluing machines. It is capable of handling many other



Left: **Londex low inertia motor**

Right: **Philips portable stroboscope**



counting problems where counting speeds up to 3,000 per minute are encountered. It is of the interrupted light beam type and imposes no load or restriction on the objects being counted.

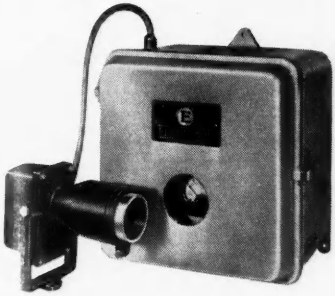
Among the exhibits of Hanovia, Ltd., the more important ultra-violet radiation mercury vapour units in quartz, both high and low pressure, are shown for laboratory use and for physical, photo-chemical, chemical, micro-biological and physio-therapeutic applications.

The exhibits of Elcontrol, Ltd., include a photo-electric temperature controller, intended for a temperature range of 750 to 1,750 deg C, a robust and simple proximity switch, infra-red sensitive equipment for furnace safeguards, automatic ignition units for use with gas burners, long range photo switches, and a compact photo-electric registration control.

A comprehensive collection of photo-electric apparatus is shown by Evans Electroselenium, Ltd., and W. Edwards & Co. (London), Ltd., display various items of high vacuum apparatus. Among a wide range of capacitors A. H. Hunt (Capacitors), Ltd., are exhibiting "Bondac" printed circuits and a new capacitor analyser and resistance bridge. In similar vein the Telecommunications Research Establishment of the Ministry of Supply is showing a number of the latest developments in components and imprinted and "potted" circuits.

Various signal generators, oscilloscopes and bridges are exhibited by Philips Electrical, Ltd., alongside strain gauges and a small portable stroboscope covering the frequency range 15 c/s to 240 c/s. De Havilland Propellers, Ltd., is demonstrating vibration testing equipment, and Wayne Kerr Laboratories, Ltd., has an S-band oscillator, an S-band Q meter and an audio-frequency analyser of the heterodyne type which measures directly the relative levels of the components of a complex waveform. A single channel

Elcontrol photo-electric pyrometer controller



Wayne Kerr waveform analyser

pulse analyser and a portable instrument for the measurement of electrostatic surface charges is exhibited by Isotope Developments, Ltd.

Apart from the exhibition a comprehensive programme of lectures has also been arranged. The proceedings were opened on Wednesday last when Mr. L. Atkinson (Ferranti, Ltd.) explained the fundamental principles and general application of electron tubes. He was followed by Messrs. L. A. Mackenzie and B. E. Jones (Christie Hospital and Holt Radium Institute) who presented a general survey of the instruments and techniques used for detecting and measuring radioactive isotopes in their application to hospital physics.

Mr. A. J. Meadowcroft (Siemens) then described a high-power high-speed stroboscope after which Mr. R. W. Horne (R.C.A. Photophone, Ltd.) dealt with the electron microscope and its present applications to research and industry. Mr. J. H. Etheridge (Cinema-Television, Ltd.) discussed the development of large screen television and the day's proceedings were concluded by Dr. D. G. Melrose who described the application of a heart-lung machine to disease in man.

On Thursday morning vibration measurement was discussed by Miss R. Winslade (Philips Electrical, Ltd.) and a survey of the electronic apparatus used in the field of medicine was made by Mr. V. F. Arnold (Marconi Instruments, Ltd.). The operation of a modern high-power television transmitting station was described by Mr. C. Buckle (B.B.C.) after which Mr. R. F. Farr (Christie Hospital and Holt Radium Institute) considered the desirable features of an X-ray apparatus to be used in radiotherapy from the point of view of the user, particularly the physicist. The general principles of analogue computing were outlined by Mr. R. B. Quarmby (Ferranti, Ltd.); he was followed by Mr. I. N. Vaughan-Jones (Ferranti, Ltd.) who explained the principles of colour television.

To-day (Friday) Mr. A. G. Wray (Marconi Instruments, Ltd.) will open the proceedings with a discussion of frequency modulation measuring equipment and Mr. J. B. Massey (Christie Hospital and Holt Radium Institute) will deal with the choice of kilovoltage in X-ray therapy. Other lectures of medical interest will be delivered by Messrs. V. H. Attree (Fluid Motion Laboratory, University of Manchester), and G. Gardner and W. Heaton (Ferranti, Ltd.). Topics of primary interest to those engaged in industry will be discussed by Messrs. R. D. Philips (Ferranti, Ltd.), T. L. Tippell (Hilger & Watts, Ltd.), H. W. Cumming (Siemens) and A. A. Shepherd (University College of North Staffs).

To-morrow (Saturday) medical topics will be discussed by Messrs. F. W. Tranter (Christie Hospital and Holt Radium Institute), Geoffrey Parr (Chapman & Hall, Ltd.), and J. C. Jones (Sheffield National Centre for Radiotherapy), and industrial subjects will be dealt with by Messrs. F. P. McKellan (F. C. Robinson & Partners, Ltd.), and L. Atkinson and J. A. Darbyshire (both of Ferranti, Ltd.).

Medical apparatus and techniques will be covered on Monday and Tuesday next by Messrs. J. E. J. John and D. C. Kendall (both of the University of Manchester), J. Yule Bogue (I.C.I.), F. Rossiter (Ferranti, Ltd.), G. A. Hay (University of Leeds), S. K. Stephenson (Christie Hospital and Holt Radium Institute) and Dr. P. R. J. Burch (University of Leeds). Industrial electronic equipment in its various forms will be considered by Messrs. E. W. Jones (Isotope Developments, Ltd.), G. W. A. Dummer (Ministry of Supply), O. H. Davie (A. C. Cossor, Ltd.), J. Greenhalgh (Ferranti, Ltd.), G. C. Collins (Evans Electroselenium, Ltd.), Prof. F. A. Vick (University College of North Staffs.), Messrs. G. B. B. Chaplin (University of Manchester), R. Calvert (Wayne Kerr Laboratories, Ltd.) and J. H. Barry (Marconi Instruments, Ltd.).

Coronation Gift to B.I.M.

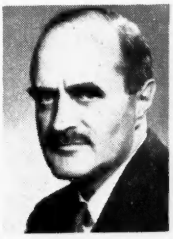
THE entire stock and goodwill of the Management Library has been presented by the proprietor, Mr. R. C. A. Vernon, as a Coronation gift to the British Institute of Management. The Library was founded, in 1930, with a nucleus of the private collection of Colonel L. Urwick, a pioneer of scientific management in this country: it has subscribers in many parts of the world. About eighteen months ago it became the property of Mr. Vernon, who is governing director of Production Publications (London), Ltd., publishers of *Factory Manager*. This addition to the Institute's existing library means that there is now gathered under one roof a collection of management literature that is the most comprehensive in the country.

I.E.E. Elections

New President, Council and Section Officers

MR. H. BISHOP, C.B.E., F.C.G.I., B.Sc. (Eng.), M.I.Mech.E., F.I.R.E., Director of Technical Services, British Broadcasting Corporation, and one of the pioneers of broadcasting in this country, is the new President of the Institution of Electrical Engineers for the ensuing year.

Mr. Bishop was born in London in 1900 and was educated at the City & Guilds College. He received his training with the Argus Engineering Co., Ltd., London, and in 1920 he was appointed assistant engineer in the Engineering Division of H.M. Office of Works. His association with broadcasting commenced in 1922, when he joined Marconi's Wireless Telegraph Co., Ltd., and in the following year he became superintending engineer of "2LO." He was appointed assistant chief engineer to the B.B.C. in 1929 and chief engineer in 1943, being appointed to his present position in August last year.



Mr. H. Bishop

Mr. Bishop has been active in the affairs of the Institution for many years, having been chairman of the Radio Section in 1941–42 and a member of the Council from 1944 to 1947. He was elected a vice-president of the Institution in 1948.

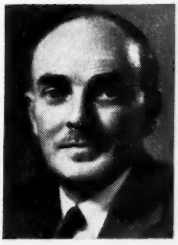
To fill the two vacancies of vice-president, Mr. S. E. Goodall, M.Sc.(Eng.) (chief engineer, W. T. Henley's Telegraph Works Co., Ltd.), has been elected, and Sir George Nelson (chairman and managing director of the English Electric Co., Ltd., and chairman of Marconi's Wireless Telegraph Co., Ltd.), whose term of office expires this year, has been re-elected. Mr. H. W. Grimmitt (deputy chief engineering inspector, Electricity Division, Ministry of Fuel and Power) is re-elected hon. treasurer.

Mr. S. E. Goodall

Sir George Nelson

The vacancies on the Council have been filled as follows:—Members: Professor Willis Jackson, D.Sc., D.Phil., F.R.S., who, as we reported last week, has taken up the position of director of research and education with the Metropolitan-Vickers Electrical Co., Ltd., Mr. G. S. C. Lucas, O.B.E. (assistant chief electrical engineer, British Thomson-Houston Co., Ltd.), Mr. R. L. Smith-Rose, C.B.E., D.Sc., Ph.D. (Director

Mr. H. W. Grimmitt



Prof. Willis Jackson

Mr. G. S. C. Lucas

Dr. R. L. Smith-Rose

of Radio Research, Department of Scientific and Industrial Research, Radio Research Station, Slough), Mr. G. O. Watson (principal electrical engineer surveyor, Lloyd's Register of Shipping) and Mr. R. T. B. Wynn, C.B.E., M.A. (chief engineer, British Broadcasting Corporation). Associate member: Mr. A. T. Crawford, B.Sc. (assistant contracts manager—home, A. Reyrolle & Co., Ltd.).

Mr. G. O. Watson

Mr. R. T. B. Wynn

Mr. A. T. Crawford

The new officers and committee members of the various Sections are as follows:—

Measurements:—Chairman, Mr. J. F. Coales, O.B.E., M.A.; vice-chairman, Mr. W. Bamford, B.Sc.(Eng.); members, Messrs. T. S. Andrew, A. H. M. Arnold, Ph.D., D.Eng., W. Casson, C. G. Garton and Prof. C. Holt Smith, B.Sc.

Radio:—Chairman, Mr. J. A. Smale, C.B.E., B.Sc.; vice-chairman, Mr. H. Stanesby; members, Prof. H. E. M. Barlow, Ph.D., B.Sc.(Eng.), and Messrs. C. G. Macfarlane, Dr. Ing., B.Sc., H. Page, M.Sc., and R. C. G. Williams, Ph.D., B.Sc.(Eng.).

Supply:—Chairman, Mr. L. G. Brazier, Ph.D., B.Sc.; vice-chairman, Mr. P. J. Ryle, B.Sc.(Eng.); members, Messrs. A. R. Cooper, E. L. Davey, B.Sc.(Eng.), D. T. Hollingsworth, H. M. Lacey, B.Sc.(Eng.), and J. R. Mortlock, Ph.D., B.Sc.

Utilization:—Chairman, Mr. B. L. Metcalf, B.Sc.(Eng.); vice-chairman, Mr. J. Hall, B.Sc.(Eng.); members, Messrs. S. English, D.Sc., H. C. Fox, F. P. Phillips, B.Sc.(Eng.), and T. B. Rolls, B.A.

Long-Distance Transmission

FOR transmitting power southwards from its hydro-electric stations north of the Arctic Circle the Swedish Power Board, after experiments with d.c., finally decided to adopt a.c. at 380 kV. A line from Harsprånget to Hallsberg was brought into operation in 1952 by providing two cables for each phase, the capacity was increased by 30 per cent and at the same time radio interference was reduced. The transmission capacity of the line is 450 MW. This year another 380 kV line, Storfinnforsen–Enköping, will be completed, while Hallsberg and Gothenburg are to be connected in 1954, Gothenburg and Scania, Sweden's southernmost province, in 1955 and Storfinnforsen–Gothenburg and Enköping–Norrköping are to be linked in 1956. Sweden will then have about 1,700 miles of 380 kV lines.

Although the 380 kV network involves a considerable increase in transmission capacity as compared with previous h.v. lines, efforts are being made to raise the capacity still further by adding series capacitor stations. One has already been installed on a 220 kV line and in 1954 a similar plant for 380 kV is to be put into operation on the southern part of the Harsprånget line, which will increase its capacity by 250 MW, or more than 50 per cent. Such stations will also form part of the other 380 kV lines to be built. The transmission maximum of a 380 kV line equipped with series capacitors is theoretically 1,000 MW, the economic maximum being about 800 MW. Satisfactory economy being ensured, it is believed that the 380 kV system will need no further increase in voltage. By using series capacitors on a general scale for the future trunk power network it is estimated that the total supply of hydraulic power available in Norrland, when local demands have been met, can be transmitted over seven or eight lines, against nearly 40 lines if 220 kV transmission had to be employed.

Much research work has been carried on in Sweden into the possibilities of high-voltage d.c. transmission. This has resulted in a scheme which is considered to be the boldest ever undertaken by Swedish power engineers, namely, a 100 kV d.c. submarine cable to link the island of Gottland in the Baltic with the Swedish mainland. With a length of 50 miles, it will be the world's longest underwater power cable and also the first for h.v. d.c. transmission.

PERSONAL and SOCIAL

News of Men and Women of the Industry

IT is reported that **Prof. A. Tustin,** Professor of Electrical Engineering at Birmingham University, has been invited by the Massachusetts Institute of Technology to accept an appointment to the Webster Chair of Electrical Engineering from 1st October next to May, 1954. He has been granted leave of absence by the University for that period. According to the *Birmingham Post*, Prof. Tustin's appointment is in connection with the reorganization at the Massachusetts Institute of teaching and experimental work in the field of heavy current electrical machines.

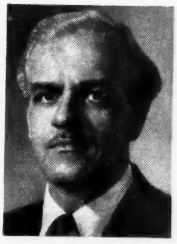
Mr. P. E. Trier, M.A., and **Mr. G. Knott,** M.A., A.M.I.E.E., have been appointed joint managers of the Mullard Research Laboratories.

Mr. Trier, who graduated as a wrangler in the mathematical tripos at Cambridge, was engaged at the Admiralty Signal and Radar Establishment from 1941 until 1950. During the war he developed direction finding techniques in the metric and centimetric regions, and was later head of the V.H.F. Communications Group. He joined the Mullard Laboratories in 1950 as head of the communications and radar division. In his present appointment Mr. Trier will direct the Electronics Laboratory and be responsible for work in the fields of communications, radar, special circuit techniques, particle accelerators, special components and materials, valve applications, ultrasonics and metal physics. He will also act in the capacity of plant head.

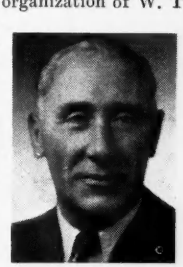
Mr. Knott, sometime scholar of Clare College, Cambridge, commenced his career as physicist to the Calico Printers' Association in 1935. From 1937 until 1940 he was engaged in research on X-ray crystallography at Cambridge University. In 1940 Mr. Knott joined the Mullard Radio Valve Co., Ltd., and was placed in charge of the Mullard vacuum physics laboratory when it was formed in 1946. Mr. Knott will continue to direct the work of this laboratory and will be responsible for v.h.f. valves, gas discharge tubes and photo-electric devices.

Mr. P. E. Trier

Mr. G. Knott



Mr. A. E. Mora, who for the past five years has been with the sales organization of W. T. French & Co., Ltd., has been appointed sales manager to Best Products, Ltd., as from 1st August.



Mr. A. E. Mora

Mr. C. R. Plant has recently taken up the appointment of chief electrical engineer, Carbonization Group, East Midlands Division, National Coal Board, and is resident at the Avenue Site, Chesterfield. He previously held the position of chief electrical engineer (from 1937 to 1953) with Simon-Carves, Ltd., in their coke oven by-products and coal washery division.

Mr. Fred Rothwell was presented with an alabaster and gilt clock at last week's meeting of the Rochdale Branch of the Electrical Contractors' Association, in recognition of his seventeen years' service as chairman. The presentation was made by Mr. Jack Redfern (Rochdale Electric Co., Ltd.), the new chairman of the Branch.

Mrs. Helen Key has taken up an appointment with the Pressed Steel Co. Mrs. Key has had a varied experience in electrical domestic science with particular application to the handling and preparation of foodstuffs, and will be remembered by many as Miss Minoprio, formerly principal of the London School of Electrical Domestic Science which she opened in 1935. During the war she worked on behalf of the British Electrical Development Association. After the war Mrs. Key was for some

years in Cologne, where she was a member of the Allied Women's Club committee specializing in matters concerned with storage and preparation of food.

The Marconi International Marine Communication Co., Ltd., announces a change in the management of its Hull and Grimsby depots, occasioned by the retirement of **Mr. J. R. Thomson,** who has been at Hull since 1942. **Mr. F. W. J. Grinter,** who has been in charge of the Grimsby depot for the past year,

Mr. J. R. Thomson

Mr. F. W. J. Grinter

will be the new manager at Hull in succession to Mr. Thomson, but will also remain responsible for Grimsby depot pending the appointment of a new manager for duty there.

Mr. Grinter began his career as a seagoing radio officer, joining the Marconi Marine Company's deep-sea staff in 1927. In 1936 he was appointed to the shore technical staff at Hull depot, and was transferred to Hong Kong in 1938 as assistant to the depot manager there, being interned by the Japanese in 1941. On being liberated in 1945 he worked to re-establish the depot, and returned to the United Kingdom to take up an appointment as assistant depot manager at Glasgow, being transferred to Grimsby as depot manager in 1952.

Mr. Thomson also began his career with the Marconi Marine Company as a member of the seagoing staff. He came ashore in 1936 with his appointment to the technical staff at East Ham, and became assistant depot manager at Hull in 1942, being promoted to depot manager two years later.

Mr. W. E. Lawton, president of the Association of Electrical Machinery Trades, has been elected to the Court of the Worshipful Company of Tin Plate Workers, alias Wire Workers.

Mr. James Bennett, contracts manager of A. Reyrolle & Co., Ltd., has been appointed a director of the company. Educated at Brockley School, London, and the Rutherford Technical College, Newcastle-on-Tyne, Mr. Bennett joined the company as an apprentice in 1920 and was transferred to the Sales Department on completion of his apprenticeship. On the reorganization of that Department, he was appointed assistant contracts manager, becoming manager of the Department in 1944. For many years he has represented the company on various committees and he is a member of the Committee of the North Eastern Centre of the Institution of Electrical Engineers.

Mr. L. H. R. Everitt, B.Sc.Eng.(Hons.), A.M.I.E.E., until recently chief engineer to Ashley Accessories, Ltd., has been appointed deputy general manager of D. H. Bonnella & Son, Ltd. Mr. Everitt received his technical training at University College, London, and with Johnson & Phillips, Ltd. Subsequently he served with the General Electric Co., Ltd., as development engineer under Dr. W. Wilson, and, during the war, with the Royal Aircraft Establishment, Farnborough. In recent years he has served on several B.E.A.M.A. and B.S.I. Technical Committees.

Mr. C. R. Witcher, C.B.E., M.Inst.T., has been appointed a director of E.T.S., Ltd. (Export & Technical Services), and **Mr. E. W. Townshend** and **Mr. W. L. Townshend** have resigned from the board. Mr. Witcher was formerly secretary to the Government of Burma and chairman of the Port Trust and Inland Water Transport Board, Rangoon.

Lady Railing, O.B.E., presenting the Leslie Gamage Trophy to Mr. J. W. Hovell, captain of the head office team at the 28th annual athletic meeting of the General Electric Co., Ltd. (see *Electrical Review,* **10th July, p. 79**)

The annual family visit to the **G.E.C. Witton Works** took place on 27th June, some 10,000 visitors touring the various workshops and laboratories on the Witton estate. Keen interest was shown in the special demonstrations of cookery, electrical appliances for the home, televison and radio. To commemorate the Coronation, each visitor was presented with a metal bookmark which was produced on one of the presses in the works.

A thousand workers from **Oldham & Sons, Ltd.**, Denton, Manchester, went to Blackpool recently for their annual works outing. Two special trains conveyed the party and each employee received a presentation envelope from the directors containing a free lunch voucher, drink ticket, free ticket for the Tower and for the Winter Garden, and a pound note as a Coronation gift from the company. There was a civic reception and luncheon at the Winter Garden, which was attended by the Mayor of Blackpool, Councillor Edwin Smith, J.P., and Mrs. Smith. Mr. John Oldham (chairman and managing director) addressed the employees, and among others present were Mr. E. Oldham (joint managing director), Mr. S. J. Wrigglesworth (general manager and director) and Mr. W. E. Platt (director).

In brilliant weather the annual athletic championship meeting and horticultural exhibition of the **Essex Electricity Supply Sports and Social Club** (Essex Sub-Area, Eastern Electricity Board) took place on 4th July at Estric Sports Ground, Great Baddow. The inter-district team championship for the Barkham Cup was won by Southend District who gained a victory by one point over the holders, Romford District; Chelmsford District were third. The senior officers' inter-district one-mile relay was won by the Southend District and J. Bradford (Southend District) won the 100 yd championship for the fifth year running to retain the district manager's trophy. The Horticultural Exhibition attracted 250 entries and the exhibit of four roses shown by R. W. J. Benyon (S.W.E. District) was awarded the "Smallholder" blue ribbon for the most outstanding exhibit; A. Bond, Chelmsford, with 56 points, gained the prize for the highest points. The Henry Wayt Cup for carnations was won by T. Little-John and the *Woman's Own* cookery medal was won by Mrs. D. M. Butler, Chelmsford. There were children's sports, and novelty races for the adults. Another attraction was the Arts and Crafts Exhibition.

In the report on the Lancashire Area Qualifying competition of the **Electrical Industries Benevolent Association National Competition,** which was published in our 5th June issue, it was stated that the national finals would be held on 28th and 29th September next. We are informed that the correct dates are 21st and 22nd September.

The Governor of Uganda, Sir Andrew Cohen, Lady Cohen and Mr. C. R. Westlake at the Uganda Electricity Board's ball

H.E. The Governor of Uganda, Sir Andrew Cohen, and Lady Cohen attended a ball held on 27th June to mark the fifth anniversary of the inception of the **Uganda Electricity Board.** The ball was organized by the Board's Amber Club Social Committee of which Mr. C. R. Westlake, chairman of the Board, is president.

OBITUARY

Mr. C. Pinkham.—We regret to record the death at the age of sixty-four of **Mr. Charles Pinkham,** M.A., at Weybridge, on Sunday, 12th July. Mr. Pinkham, who was widely known in both advertising and sporting circles, had the unique distinction of being the only Cambridge athlete ever to have been awarded a Blue for both Soccer and Rugger; in addition he won his half Blue for lacrosse and gained his A.F.A. Cap against France.

The late Mr. C. Pinkham

Born in 1889, the son of Mr. (later Sir) Charles Pinkham, O.B.E., D.L., J.P., he was educated at The Leys School and Caius College, Cambridge. He joined the General Electric Co., Ltd., in October, 1913, as personal assistant to the late Lord Hirst. On his return from commissioned service in the Forces overseas during the 1914-18 war, his great organizing abilities were given full scope when the offices of the company were transferred in 1920 to Magnet House, Kingsway, from Queen Victoria Street, the detailed

arrangements of the successful move being his complete responsibility.

After a period of being in charge of Stock-rooms and Order Department, he was appointed in 1927 manager of the Publicity Organization of the company, in which capacity he was responsible until his retirement in June, 1950, for the wide range of G.E.C. publicity. For the last fourteen years of his active service with the company he served as a member of the Council of the Advertising Association and the B.E.A.M.A. Publicity Committee, and it was during this period that he became so well known in this field of activity. His many friends knew him as a man of strong character with a great sense of humour and human understanding.

To Mrs. Pinkham and her son John we extend our deepest sympathies.

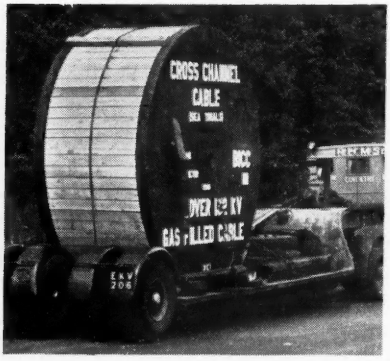
Mr. R. Kullman, M.B.E., area sales manager of Measurement, Ltd. (Electricity Division), died on 2nd July at the age of fifty-four. He joined the company in 1948.

Mr. C. le Maistre.—A memorial service for Mr. C. le Maistre, whose death we reported last week, is being held at noon to-day (Friday) at the Queen's Chapel of the Savoy, London, W.C.2.

Cross-Channel Power Cable

IN our issue of 3rd July (page 44) we reported that British Insulated Callender's Cables, Ltd., had been awarded the contract for the sea trials in connection with the proposal to connect the 132 kV grid of the British Electricity Authority with the 225 kV system of Electricité de France. The accompanying photograph shows a section of cable being transported to the coast for the trials.

One of the two half-mile lengths of 132 kV gas-filled cable en route to Dover, where it will undergo sea trials for the Cross-Channel project



Electric Cooker Publicity

NO time has been lost by the Eastern Electricity Board in renewing its cooker sales campaign, following the relaxation of the ban on advertising. Promotional development problems generally had already been reviewed and policy explained at sales conferences attended by the service centre staff and to keep them up-to-date with information about appliances, installations, etc., a quarterly "Sales News" is being circulated. The first issue explains that the main effort this year is being devoted to the sale of electric cookers, the theme of the basic press advertisements being why typical consumers in the Board's Area prefer them. In addition to advertisements in 120 local newspapers, 500 large posters are being displayed throughout the Area, with smaller ones in tube stations, electricity service centres and elsewhere. A broadsheet is being prepared illustrating in full colour seven typical cookers from the Board's range available on seven years' hire purchase, and there is also to be a novelty folder.

E.I.B.A. in 1952

THE report for the past year which is to be presented at the annual meeting of the Electrical Industries Benevolent Association on 22nd July again sets forth particulars of typical cases in which the Association has intervened with gratifying results. Regret is expressed at the death of Mr. A. Brammer who was a very active worker for the Association; for five years he was chairman of the Relief Committee.

Reference is made to the completion and handing over of the bungalow at Broome Park provided by the Electrical Contractors' Association, to the Golf Championship and the Grosvenor House Ball last November. The Association's thanks are accorded to exhibition organizers who gave it space in their displays.

The accounts show that the year's income was £56,116 (as compared with £52,458 for 1951). Expenditure totalled £50,336 (against £51,441), leaving a surplus of £5,780 (£1,017).

Demand for B.E.A. Inquiry

A DEMAND for an official inquiry into the administration of the British Electricity Authority was contained in a resolution on the agenda for the resumed conference of the Transport and General Workers' Union at Southsea this week. It urged that particular attention should be paid to three points: (1) the experience, prior to nationalization, of executives with salaries of more than £1,000 a year; (2) the method of appointment of executives in the industry since nationalization; and (3) that in the opinion of members in the industry, over-centralization was causing frustration and wastage.

Industry and the House

Television Policy Discussed

By A. M. F. PALMER, A.M.I.E.E., M.P.

ABODY whose opinions will be scrutinized fairly soon in the House of Commons, I think, is the Pilkington Committee. It will be remembered that the Committee was established a little time ago under the chairmanship of Sir Henry Pilkington to look into possible improvements in the fuel advisory services as suggested by the Ridley report.

Mr. Geoffrey Lloyd recently disclosed that the Pilkington Committee had come down in favour of forming an " independent non-profit-making " company, to take over the existing service provided by the Ministry of Fuel and Power and expand it. It is recommended that the British Productivity Council should appoint the board of the new company and that the three nationally owned fuel industries, coal, electricity and gas, should find the money to the tune of nearly half a million pounds. This system of financing the venture would seem, in the absence of Ministerial explanation, unusual. After all, even in these topsy-turvy days, industrial users of fuel have at least as great an interest in its economic and efficient utilization as producers and some form of moderate levy on industry in general might have been a convenient device to bring everybody in. Since the Ridley Committee did in fact propose this course it will be interesting to hear why the Minister has departed from it.

Sponsored Television

The Parliamentary battle between the " pro " and " anti " sponsored television forces has taken a new turn. After telling the House about B.B.C. projects likely to make television available to another six or seven million people, Mr. Crookshank, speaking for the Government, went on to announce a " pause " in the previously expected advance towards—at least—an experimental system of competition. Many opponents of Her Majesty's present advisers will describe this piece of diplomacy as nothing more elevated than an attack of cold feet. Mr. Herbert Morrison was a little kinder, however. He went so far as to deny that sponsored television was a " party political question " at all. It was, he said—the unintended implication was startling—a " national, moral question."

Mr. Morrison thought the Government was making modifications quite rightly because, after all, there was " widespread apprehension " among " responsible people and leaders of thought." Was it worth the while of the Government to go on with this bad business at all?

Government's Attitude

But Mr. Crookshank proved himself as effective a stonewaller as ever. He refused to be enticed by Mr. Morrison's apparent disinterested concern for the good of all. The statement should be taken as indicating the way " the Government's mind is working " and nothing more. When the White Paper arrived in the autumn would be the time for the House fully to discuss the issue, he suggested, with a quiet smile across the dispatch box.

But the matter was not allowed to end with bland exchanges between the front benches. Questions came thick and fast from back benchers for many minutes until Mr. Speaker intervened. There was one light-hearted incident when Sir Herbert Williams, that sturdy individualist whose side in this matter need not be in doubt, charged Mr. Mayhew, Labour's crack television performer, with not declaring his interest. Since it is not unusual for Conservatives to be taunted with possessing a material concern for the expansion of privately owned television this was a belated turning of the tables. On these occasions knowledgeable friends of those traduced, who fancy themselves experts in Parliamentary procedure, are never backward in taking speedy supporting action. But when appealed to for a vindication of

Mr. Mayhew's honour, Mr. Speaker confessed with a disarming glance that he did not himself take " seriously " Sir Herbert's remark. Nor, I think, had anyone else, if the truth be told.

Purchase Tax Basis

The Finance Bill was considered for two days last week at the Report stage. Once again all the anomalies and complexities of the purchase tax were well and truly discussed. Mrs. Castle, who represents Blackburn for Labour, moved a new clause under which purchase tax would be paid on the actual price to the retailer and would not include " uplift " to compensate for omission of a wholesaler. Mrs. Castle apparently holds a view not uncommon to tax payers in general; she said the Chancellor was getting sums of revenue to which he was not entitled morally; to make matters worse the poor consumer was paying far more for articles than he need. This is an old issue on which there is a divide between retailers and wholesalers. The Financial Secretary to the Treasury, Mr. Boyd Carpenter, pointed out that Mrs. Castle's scheme would work in favour of the large trader. He had been advised that the implementation of the Grant Committee's recommendation on the point did not require legislation; he was looking into that aspect of things. Should difficulty arise, the Government would not hesitate in next year's Finance Bill to make any change decided on retrospective.

After Mr. Gaitskell had intervened, Mr. Butler felt the matter sufficiently important to have a word himself. He said that he had had a digest made of trade opinions since the publication of the Grant report, but the result was not representative enough for the Government to make a decision at the moment.

The Opposition admitted that the uplift principle had existed since the start of the purchase tax but felt that reform was now so urgent that they must divide the House. The Government came through all in one piece with a majority of twenty-seven.

PARLIAMENTARY NEWS

By Our Special Reporter

IN the House of Lords last week, Earl De La Warr, Postmaster General, made a statement on the report of the Television Advisory Committee. He said that the report dealt with highly technical matters, but in brief it stated that television broadcasting in this country would develop in future in three separate ranges or bands of very-high and ultra-high frequencies, in addition to that now in use. Techniques for the two u.h.f. bands were not yet fully developed in this country and it was only for the lowest of the three bands, namely that referred to in the report as Band III, that new receiving sets, or adaptors for current sets, and the necessary transmitting equipment, could be produced reasonably quickly. In this band, however, only two channels were at present available for broadcasting, and the questions about the ultimate use of the whole band, which in any case provided only a limited number of channels, were therefore hypothetical at present.

The Government accepted the Television Advisory Committee's recommendation that the permanent use of these limited channels, including both those now available and those that might later be freed, should be mainly for stations covering large areas. It might, however, be possible to consider their use by short range stations on a temporary basis, with an undertaking from the user to transfer to a higher frequency, if required to do so, when technical developments made such a change possible.

To those in the radio industry who wished to design and develop adaptors and new sets in readiness for any possible alternative programmes, he would therefore say that Band III was the only band likely to be used during the next few years. He took the opportunity also to reassure intending purchasers of television sets that there would be no difficulty in fitting the adaptors to current sets and in some cases older sets.

Radio Hire-Purchase

In the House of Commons Mr. Rankin asked the President of the Board of Trade, whether, in view of the falling-off in the demand for television and radio sets, he would now consider excluding these items from the Hire-Purchase and Credit Sales Agreements (Control) Order, 1952, or, alternatively, repeal the Order entirely.

Mr. Henry Strauss, the Parliamentary Secretary, replied in the negative.

V.H.F. Broadcasting

Mr. Gammans said that the B.B.C. could not make any firm plans for v.h.f. sound broadcasting, nor could the radio industry produce

the transmitters or the special receiving equipment which would be required, until the form of modulation for v.h.f. had been decided. The B.B.C. intended to use existing stations wherever appropriate and its post-war permanent television stations had been designed so that v.h.f. sound transmitters could readily be added. Detailed plans for a v.h.f. scheme could not, however, be settled until the Postmaster General had had the advice of the Television Advisory Committee, whose report was expected in the autumn.

New Television Station

Replying to Mr. Gibson, Mr. Gammans said that the new television station at the Crystal Palace would not be on a public open space. The L.C.C. owned the land which the B.B.C. wished to buy and negotiations were still in progress. The area of the site would not exceed two acres.

B.B.C. Capital Expenditure

Mr. Gammans said that in the financial year 1953–54, the B.B.C.'s total capital expenditure, including initial expenditure on the developments recently announced, was expected to be of the order of £2 million, but much depended upon how quickly the Corporation could proceed with the work. Capital expenditure, excluding the external services, for the past five years, with the proportion devoted to television in parentheses, was as follows:—1948–49, £664,000 (35 per cent); 1949–50, £1,209,000 (67 per cent); 1950–51, £1,143,000 (66 per cent); 1951–52, £1,435,000 (71 per cent); 1952–53, £1,292,000 (72 per cent).

Telephone Development

Mr. Gammans said that 350,400 telephone connections were made in the year ended 31st March, 1952, and 314,800 last year. At 31st March last 427,200 applications were outstanding, but in view of the continuing high level of new demand he could not say when all these applications would be met. Progress would, of course, depend on the financial resources available.

London Railway Plans

Replying to a debate on congestion on the Central London Railway, Mr. Gurney Braithwaite, Parliamentary Secretary to the Ministry of Transport, said that the key to easing pressure on the underground railways lay in the building of a new cross-London tube from Walthamstow via King's Cross to Victoria, with an extension to South-West London. The London Transport Commissioners had asked that this tube should be accepted as the next major work to be undertaken in the London area, and this matter was still under consideration by the various Ministers involved.

It was, however, generally agreed that the northern suburbs had the greatest claim to some improvement of travelling facilities, and many suggestions had been considered, among them the electrification of the surface lines which served Enfield and Chingford. The London Plan proposed the electrification of those lines, to be operated by trains of the tube type into the centre of London via Liverpool Street.

Continuing study since the publication of the report showed that progress was more likely to be made by a scheme for the operation of main line electric stock. He would point out, however, that the electrification of the Chingford and Ilford branches would not of itself provide a solution to the traffic problem in the north-eastern sector, but might aggravate it. The whole problem of improved conditions of rail travel in London, he said, was being kept under constant review by the British Transport Commission.

Windmill Generators

Replying to a question by Mr. Harold Neal on the generation of electricity by windmills, Mr. Geoffrey Lloyd said that experimental work was in hand on two 100 kW windmills, one erected by the North of Scotland Hydro-Electric Board in Orkney and one just completed for the British Electricity Authority and now being tested by the manufacturers before erection in Wales. His Department was collaborating with these organizations and with the Electrical Research Association on basic work, and had recently bought for test a smaller windmill working, like the British Electricity Authority 100 kW machine, on the Andreau principle.

Rural Electrification

Mr. Braine asked the Minister of Agriculture if he would ascertain from the British Electricity Authority how much of the increased capital expenditure approved for rural electrification would be allocated to the Eastern Electricity Board; and what proportion of this sum was allocated to the Essex Sub-Area.

Sir Thomas Dugdale said that the allocation of the increased capital expenditure among the Area Boards was entirely a matter for the British Electricity Authority and the Area Boards, and he had no power to require them to provide the information requested.

B.E.A. Generating Programme

Mr. Nabarro asked the Minister of Fuel and Power what was the aggregate installed capacity of the British Electricity Authority's power stations at 30th June, compared respectively with one and two years ago; what further capacity was to be installed before 31st March, 1954; and, in view of the accentuated peak-load demand anticipated next winter, arising from increased industrial production and greater use of electricity for domestic space and water heating, due to the shortage of house coal, what

steps he was taking to avoid interruption of production caused by low frequencies, load shedding, power cuts and other generating ills.

Mr. Geoffrey Lloyd said that the installed capacity was 14,760 MW in 1951, 16,020 in 1952 and 17,490 this year. The programme up to 31st March next was about a further 1,300 to 1,400 MW. The increase in plant this year was expected to be considerably more than the increase in demand from all causes.

Mr. Nabarro asked if the shortage of house coal was not going to lead to a rush on electricity at peak hours by the use of electric fires which might greatly impair industrial efficiency and lead to power cuts, low frequencies and so on. What did the Minister think about reverting to the 1951 arrangements for load spreading of at least 20 per cent by industry in the coming winter?

Mr. Geoffrey Lloyd said they were considering that very carefully.

Fuel Levy

Mr. Palmer asked the Minister of Fuel and Power if, in his financial arrangement for the establishment of the independent Fuel Efficiency Advisory Company recommended by the Pilkington Committee, he would make provision for a levy on privately owned industry to supplement the sums proposed to be found by the publicly owned coal, electricity and gas industries.

Mr. Geoffrey Lloyd said he had no powers to impose a levy and he preferred to rely on fees and voluntary contributions.

Mr. Palmer asked whether it was not most undesirable, from the point of view of public policy, that publicly owned industries should be used to subsidize privately owned industries in that way, and since the whole of industry had a general interest in fuel efficiency, and the Ridley Committee had suggested that a levy should be used to finance an organization of that kind, would he not reconsider it?

Mr. Lloyd replied that it was also in the interests of nationalized industries to secure some decrease in demand since none of them at the present could guarantee full supplies during the whole of the year.

Mr. Irvine asked whether it was the Minister's argument that the fact that it was comparatively easy to collect funds from publicly owned industries could be regarded as justifying the subsidizing of private companies from public funds.

Mr. Lloyd said it was not.

PHOTO-ELECTRIC CELLS

Revised British Standard

IN 1935 the British Standards Institution first issued B.S. 586 which dealt with photo-electric cells of the emission type for sound film apparatus. One of the primary objects of that standard was to establish a simplified range of four cells from the great variety of sizes and types which were then in use. Unfortunately the sizes then chosen did not meet with universal acceptance and cells still have to be made in a wide variety of types in order to meet the needs of individual manufacturers of equipment.

The British Standards Institution has accordingly given careful consideration to the revision of this standard, and a new edition has now been published, price 2s 6d. Like the original publication it relates solely to cells for use in sound film apparatus. The specified performance characteristics of the cells have been brought into accord with present-day requirements and cover anode voltage, sensitivity, dark current, variation in frequency response, gas factor, stability and noise current. A code system of symbols for designating the cell size, type of basing and spectral response is included.

Because of the great variety of sizes and types of cells already in use, the dimensional unification of cells necessarily presents very considerable difficulties. The B.S.I. Committee has, however, made a close study of the many existing cells and has made a selection of four sizes of cells, with associated types of basing, which are now put forward in this present edition of the standard. It is appreciated that the design of a sound-head may not always permit of ready alteration, and that for some considerable time it will be necessary for many types of cells to continue to be supplied for replacement purposes. Nevertheless, in order to promote economic production and rapid replacement, the B.S.I. strongly urges that wherever possible existing apparatus should be modified to accept one of the cells now recommended, and that all new apparatus should be designed to use these cells.

Considerable importance is attached to the correct use of terms associated with photo-electric cells. A more extensive series of definitions is now included which will materially assist in a correct understanding of the terms used.

VIEWS on the NEWS

By REFLECTOR

I ALWAYS like to see what the gas industry is doing at exhibitions. At the Royal Show last week the Gas Council's stand, apart from attracting good audiences to its cooking demonstrations, seemed to be very sparsely attended, in marked contrast with the E.D.A.-North Western Electricity Board's stand which was consistently crowded—even when it wasn't raining! From the point of view of appearance, the gas appliances might at a casual glance well have been electric: certainly if the old saw means anything the electrical industry has every reason to feel flattered. A notable exception, however, was in a greenhouse where the bulky pipework of the heating apparatus apparently put out of use the whole of one side of the building. One could not help comparing it with the neatness and compactness of electric tubular heaters and soil heating cables.

* * *

I have had a chance of seeing the reply by Mr. V. W. Dale, general manager and secretary of E.D.A., to the letter in *The Times* on electrical publicity for farmers to which I referred last week and it certainly throws a somewhat different light on Mr. Waite's criticism of the Area Boards. While appreciating the compliment paid to E.D.A., Mr. Dale says that the "useful information" supplied to Mr. Garth Waite is available to any farmer who applies for it. He is surprised to learn that difficulty is experienced in obtaining such information from the Area Electricity Boards since the extended use of labour-saving electrical equipment is almost essential to the economic success of mains extensions to the more remote farms. Evidence of the readiness of the Electricity Boards to advise their farmer customers and to support that advice by practical demonstration is afforded by the electricity stand at almost every agricultural show in the country. In addition, the Boards are fully represented on the Association's Rural Electrification Advisory Committee which is regularly engaged on the production of reports, technical booklets, and films on the application of electricity for general and dairy farming. Mr. Dale adds that the Ministry of Agriculture, the National Farmers' Union, the Royal Agricultural Society of England and other organizations serving farming interests are also represented on the E.D.A. Rural Electrification Committee.

* * *

Electricity Boards will thank Mr. Neville Warburton, secretary of the Lancashire branch of the National Farmers' Union. At a meeting of the executive committee of the branch there were complaints about guarantees demanded by the North Western Electricity Board before proceeding to give supplies to rural districts. Mr. Warburton said that the greatest help could be given to rural electrification schemes by people collaborating to make a supply of power to their Area worth while. "We cannot criticize the Board," he said, "if all farmers in a district are not co-operating to the maximum to help bring a scheme into being." What is wanted, in fact, is something like the group schemes in the South Western Area mentioned by Mr. S. F. Steward at the British Electrical Power Convention.

* * *

It is suggested in a letter to the *Herald* (Farnham) that where meters have been changed on a conversion from d.c. to a.c. there has been "a steep upward trend in recording." The correspondent says that the South Eastern Electricity Board is "not content with increasing to the extent of 100 per cent the cost per unit to the consumer, as well as increasing the standard charge, but must speed up meter recordings also." There seems to be nothing to which these wicked Electricity Boards will not stoop in their constant war against their consumers.

The Royal Show

Special Emphasis on Rural Electrification

THE recent allocation of a further £1½ million to rural electrical development during the next eighteen months aroused particular interest in electrical exhibits at the Royal Show held at Blackpool last week. This interest was by no means confined to farming equipment, at least as much attention being paid to appliances for use in the home.

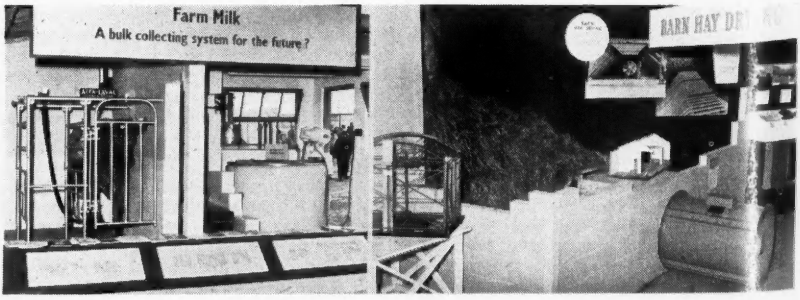
Probably no exhibit in the Show was visited by more people than that arranged jointly by the North Western Electricity Board and the British Electrical Development Association. One of the most effective of its kind we have seen, this display showed in a straightforward fashion the various ways in which the farmer could increase his output and improve the living conditions and amenities of his family and employees.

While the equipment shown was representative of every aspect of electricity in modern farming activities, particular attention was paid to dairy and small mixed farms, separate sections being devoted to the use of electricity for dairying, water supply, farm workshop, barn machinery and poultry and pig keeping. Also included in the exhibit was a full-scale Electricity Service Centre housing an extensive selection of domestic appliances such as water heaters, refrigerators, cookers, vacuum cleaners, kettles and irons, with a spacious inquiry bureau. Practically all the equipment was shown working.

The dairy section was divided into two parts, the first dealing with the use of electricity by the producer-retailer dairy farmer, and the second with the producer dairy farmer. Modern mobile milking equipment was shown, together with an electrically-lighted shippon, thermal storage steam raisers, water heaters and chilled water milk coolers. There were also examples of battery electric vehicles for milk delivery purposes.

A variety of motor-driven pumps of various sizes and types showed how simple is the provision of a piped supply of water to the farm and farmhouse when electricity is available. In the farm workshop section, arc welding equipment and electrically operated tools for wood and metal working were among exhibits designed to show how electricity renders the farmer independent of outside help for carrying out running repairs. The large barn machinery section included electrical equipment for both in-silo and platform grain drying, together with barn hay drying. Various methods of handling grain, as well as several barn machines, were demonstrated.

A bulk milk collecting system for the future suggested by the Milk Marketing Board and (right) a barn hay drying exhibit on the E.D.A.-North Western Electricity Board's stand



The main feature of the poultry display illustrated the use of electricity in connection with the deep litter method of keeping poultry and two methods of lighting the poultry house for increasing the winter egg yield. There were also examples of poultry pluckers, infra-red brooders, automatic poultry feeders, and egg graders, and an expert demonstrator showed how a deep freeze unit could aid the farmer in his business. The pig keeping section contained a variety of simple but efficient electrical devices for reducing farrowing losses, and for rearing healthy pigs. They included infra-red farrowing heaters, floor heating equipment, foster mothers, pig food boilers and mixers.

Commercial horticulture is an expanding industry in North West England. In the horticultural section, which is the biggest display of its kind at the Royal Show—about six times as big as at Newton Abbot last year—some of the many applications of electricity available to the commercial grower were demonstrated. In the grower's house, for example, there was equipment for intensive tomato growing, as well as the raising of bedding plants, special emphasis being placed on light irradiation. Other applications included the use of electricity for soil warming, frost protection, soil sterilization and for the light retardation control of chrysanthemums.

Another comprehensive array of electrical equipment was to be seen on the General Electric Co.'s stand, where a complete range of apparatus for the farm included household equipment. A display of platform and in-silo grain drying equipment consisted of Woods propeller and "Aerofoil" fans with built-in totally enclosed motors, and duct air heaters, together with control panels and ducting. These grain dryers, supplied either for horizontal or vertical mounting, are very compact, and have a low capital cost. Other advantages are absence of contaminating fumes, low fire risk and the fact that very little supervision is required. The platform grain dryer was shown complete with "Transverco" platform, which up to 30-bag capacity does not require any intermediate supporting wall. In addition a single-phase sack hoist was shown in operation.

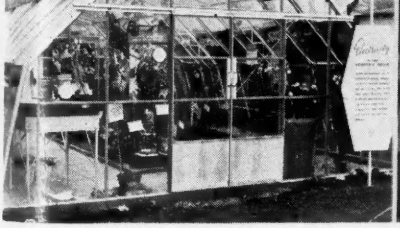
Dairy equipment included heat storage, sterilizing and water heating appliances designed to meet the demand for equipment with a low electrical loading. An example is the 1 kW dairy water heater with a capacity of 20 gal which provides a convenient and inexpensive source of hot water both morning and evening. It has a copper interior, occupies very little floor space, and can be installed at low cost.

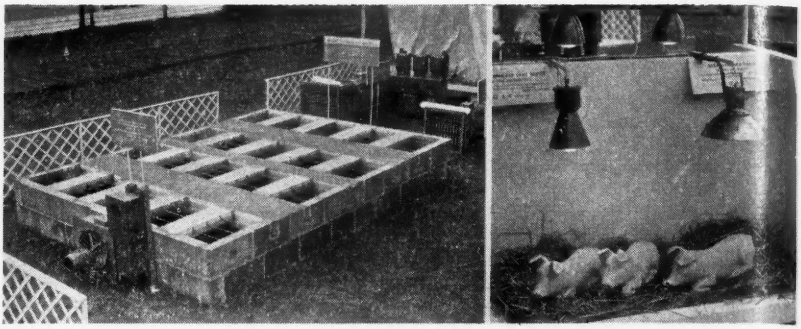
The company's range of infra-red heaters for pig farrowing now includes a single- and a two-lamp unit. The new dual-purpose infra-red unit with dull emitter sheathed wire heater will be welcomed as it can be used for both pigs and poultry.

Among horticultural exhibits were soil sterilizers for both the amateur and professional grower, plant illuminators, and soil warming cables and transformers. It has been estimated that the capital expenditure involved in the installation of the illuminators can be recovered during the first year.

Household equipment comprised the DC114 cooker with the drop-down oven door, a new 3 cu ft table top refrigerator

Left: **The grower's house at the E.D.A.-North Western Electricity Board's stand equipped for intensive tomato growing and the raising of bedding plants.** *Right:* **A portion of the cooker display in the Electricity Service Centre**





G.E.C. 13 kW platform dryer with 20 bag " Transverco " platform and (right) infra-red pig farrowing heaters

with a sealed unit, and a new cylinder suction cleaner, together with other labour-saving appliances.

Much work has been done on redesigning many Brook products during the last few years and improved examples of motors and starters suitable for farm and dairy machinery were shown. A newcomer was a hand-operated star-delta starter of the drum type capable of handling three-phase motors up to 15 h.p. Another recent introduction, the British Standard motor to Draft Specification C.N. (ELE) 6814, is of the drip-proof type. A further range of totally enclosed machines to the same specification will be available shortly.

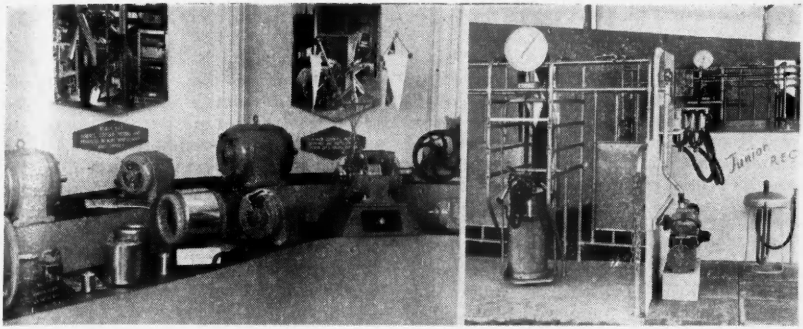
The importance of milk recording was demonstrated on the Milk Marketing Board's stand, where, besides a live exhibit of six cows, was a novel feature showing the layout of a bulk collecting system for the future. Small scale models of dairy equipment were used to good effect by Perkins Clean Milk Equipment, Ltd., to demonstrate its sterilizing equipment, cold rooms and other dairy plant. A recently introduced product is a water heater and steam raiser available with various loadings from 12 to 36 kW, a combined trough and sterilizer being another item of special appeal to the small farmer. The " Junior " recorder milking equipment attracted a good deal of attention on the Gascoignes (Reading) stand.

Refrigeration equipment for all farm purposes was again well to the fore. The " Prestcold Showmobiles," combined with large marquees, displayed a comprehensive range of " Prestcold " models including milk coolers, farm freezers, dairy cold rooms, display cases, frozen food cabinets, conservators, frozen food or ice cream and domestic refrigerators. A full range of equipment was also shown by L. Sterne & Co., Ltd., International Refrigerator Co., Ltd. (" Coldrator "), Frigidaire, L. D. Wood (Eldwood), Ltd., Nash-Kelvinator, Ltd., York Shipley, Ltd., and J. & E. Hall, Ltd.

This year two of the four winners of silver medals for new implements for agricultural or estate purposes were electrically operated appliances. A pig feed mincer by Taskers of Andover (1932), Ltd., breaks down and mixes most kinds of raw feeding-stuffs, reducing them to pulp in a few seconds. At the base of its 20 gal hopper propeller-shaped knives, rotated at high speed by means of a 3 or 5 h.p. motor, not only cut but also cause a rapid flow of mixture which is both stirred and passed continuously through the cutting area.

The other medal-winning item was a Fullwood & Bland direct-to-churn recorder which makes in-churn milking and recording possible in existing cowhouses. It consists of a main overhead track down the centre of the shed with a turntable and branch track opposite each pair of cows. Milking units can be run along the branch track to take up the normal milking position by the cows' forelegs, independently of one another.

Three other items had their awards deferred pending further development. These included the Vaccar " Ruakura " milk flow indicator, which can easily be fitted to any type of milking plan to

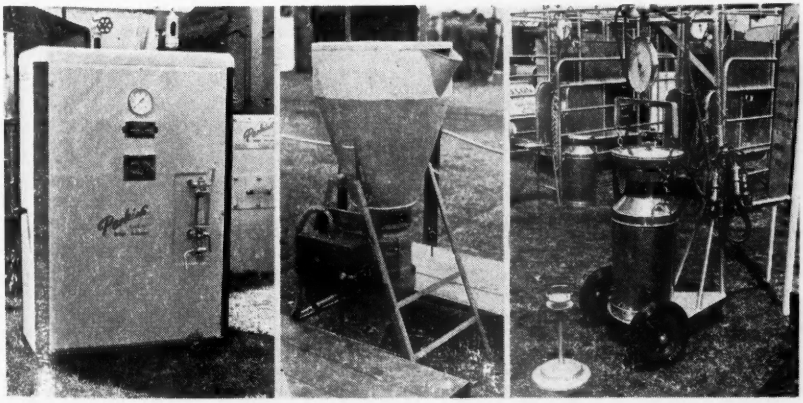


A selection of Brook motors for agricultural purposes and (right) Gascoigne's "Junior" milker recorder

indicate accurately the milk flow at the beginning and end of the milking; the Weycroft vacuum-in-churn cooler which takes the place of a churn lid in a normal direct-to-churn recorder system incorporating rotation by water, the milk being thrown to the inside surface of the churn and thereby making an internal surface cooler while under vacuum; and Cooch & Sons' vegetable washer, comprising a pre-soak tank into which vegetables are fed and from which they are raised by an endless belt of rollers and carried between oscillating spray lines while at the same time being turned over and over. Among other electrical apparatus entered for the competition were the Agricultural Mixers Co.'s "Feedmaster" food sterilizer and mixer, the Expert Chick Sexers' "Chixexer" and the Western Incubators' "Turkeyette" cabinet incubator of 780 egg capacity for hatching turkeys.

A specially large number of fixed and mobile generating sets were on view this year. A 5 kW remote control, diesel-driven generator supplied power for a large revolving display turntable, a television and radio set, a water pump, and lighting at the Newage Group stand. As at the Bath and West Show, A. C. Morrison (Engineers), Ltd., arranged a fuel consumption test for one of their 6 kW sets used to light the mobile Morrison showrooms, and to provide power for fans, water heaters, coolers, pumps, radio and television on the stand. A 25 kVA Ford power pack and a 450 W "Tom Thumb" low voltage lighting set and battery charger

Left to right: **Perkins 18 kW water heater and steam raiser, Taskers pig feed mixer and Weycroft vacuum-in-churn cooler**



were the newest products among nine other examples of Morrison generating sets.

The new Lucas 24 V "Freelite" wind-driven lighting set was accompanied by new tractor lighting sets, combined ploughing lamps and rear lights, tractor radio and batteries. Electrical equipment for agricultural tractors and for stationary and portable engines was shown on the C.A.V. stand. Practically every possible pumping requirement of the farmer or country-dweller can be met by James Beresford & Sons' range of pumps. These include the "Beresford" submersible centrifugal electric pump which is utilized for raising water from wells and boreholes and is actually installed with the complete unit submerged in the well.

Supplying the electricity required at the showground—there was a total connected load of 2·7 MW and a maximum demand of 2 MW—was no mean feat. The North Western Electricity Board, No. 4 Sub-Area, which also carried out the majority of the services on exhibitors' stands, solved the problem by tapping the 0·2 sq in 6·6 kV cable from Marton to St. Walburga's Road substation which passes the site. At the tapping point a ring main isolator comprising two isolators and tee-off cable box had the isolator on the Marton side normally closed, the other isolator providing a stand-by supply from St. Walburga's Road.

From this point a 0·1 sq in cable was taken into the showground and to complete the ring was continued to the Aerodrome substation, where temporarily two transformers were put on to one circuit breaker, releasing a second breaker for connection to the Show cable. Thus three points of 6·6 kV supply were available.

The ring was taken through three substations, one of which contained a 750 kVA 6·6 kV/433/250 V transformer and the other two contained 500 kVA units. From one of the latter substations a feed was taken to a fourth substation also equipped with a 500 kVA transformer. Six-way distribution pillars were erected close to the huts in which the substations were housed.

The necessity for crane clearance precluded the use of overhead lines over most of the showground and the h.v. cable was therefore laid 2ft deep in the ground and tile protected. Switchgear, transformers and pillars are considered wholly recoverable and cable in lengths of over 50 yd 90 per cent recoverable. Shorter lengths of cable are considered 60 per cent and service equipment 95 per cent recoverable.

Rockets for Conductor Stringing

COASTGUARDS' rocket equipment was used recently to shoot a light rope across the Aber Gorge, near Bangor, North Wales, to act as a draw line for conductor stringing on a 132 kV overhead line. The gorge is a valley approximately one mile wide at the crossing point and almost 600ft deep, with steeply sloping sides. As the area is a national park great care had to be taken to minimize any possible damage to trees and shrubs. The section over the gorge is part of the 55 mile long Queensferry–Dolgarrog–Bangor line which is being erected by the British Insulated Callender's Construction Co., Ltd., for the Merseyside and North Wales Division of the B.E.A.

Three towers were erected, one at the top of each side of the gorge and a third on a spur almost in the centre of the valley. Work on erecting the first span started early this month, when local representatives from the coastguard service brought their rocket equipment—similar to that used at sea for erecting a breeches buoy—to the tower on the spur in the valley. The rocket, with a rope attached, was fired a distance of 1,425ft towards the tower on the east side of the gorge. The end of the rope near this tower was attached to a balloon winch, while the other end was secured to the conductor which was wound on drums near the middle tower. The steel-cored aluminium conductors were then hauled across and erected, the entire span being 1,800ft.

The procedure for erecting the second span—a distance of 2,400ft between the middle tower and the tower on the west side of the gorge—was partially reversed. The rocket was fired 1,800ft from the top to the middle. The drums of conductor and earth wire were placed at the top tower and the balloon winch, still in its original position on the east side, was utilized to draw them into place. The second span will be finally erected this week-end. Both spans consisted of three s.c.a. conductors, each comprising 30/0·110 aluminium and 7/0·110 steel, and a similar earth wire.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Low Voltage Domestic Appliances

IN view of certain inquiries we have received we wonder whether the electrical appliance trade as a whole realizes the very large number of 12 V and 24 V lighting circuits supplied from petrol electric generators that are in use throughout the country, including, of course, installations in yachts, caravans, etc.

As far as we can ascertain only one firm offers domestic refrigerators to operate at 24 V. Several firms can supply 24 V soldering irons, electric razors, blowers, fans and hedge clippers, while most lamp manufacturers offer lamps with standard bayonet fittings from 12 V upwards, and we rather believe that the greater demand for these comes from domestic users.

From our contact with large numbers of owners of low voltage circuits we find that they would be quite willing to install larger-capacity storage batteries to deal with the extra load, and on certain items, television, radio, etc., have taken the line of "most resistance" by installing step-up rotary transformers.

It may be that manufacturers are so occupied with producing standard mains equipment that they have not been able to turn their attention to the low voltage market, but we should be pleased to have details of low voltage domestic equipment that is available.

TEDDINGTON ENGINEERING CO., LTD.
H. D. CLARK,
Teddington, Middx. *Director.*

Are Qualifications Necessary ?

WITH regard to the letter published in your issue of 10th July under the above heading, I have just returned to this country after fifteen years in India in responsible engineering appointments in the electricity supply industry, and after three months am no nearer obtaining a suitable appointment commensurate with my experience and qualifications. In my opinion as long as anybody with some mechanical knowledge can class himself as an "engineer," and who is willing to accept a lower salary than the chartered engineer, then employers will continue to take advantage of this fact.

Imagine the position if anybody with some first-aid experience could call himself a doctor. The time has come when this country should adopt the ruling, which I believe is already in force in Canada, that no person may class himself as an engineer or be employed in positions of responsibility without the necessary technical qualifications and training.

"DISILLUSIONED."

Lamps for Street Lighting

I HAVE read with interest Mr. Pulvermacher's article "Lamps for Street Lighting" (*Electrical Review*, 10th July, page 72) in which he so ingenuously shows sodium lamps to be the best for highway lighting.

While not wishing in any way to decry the merits of sodium lamps—I am as interested in them as in any other type—I must point out that the position is not quite as he describes. He appears to consider the lumen output of a lamp as a measure of radiated energy or power, whereas actually it is a measure of the eye response to the emitted radiation so that it already takes into account the spectral sensitivity curve of the eye. Sodium lamps have a high efficiency largely *because* their luminous radiation is at a wavelength which nearly corresponds with the peak of the sensitivity curve, and to apply the curve twice over, as he unwittingly does, is quite incorrect.

As quite a number of interested people may fall into the same error I hope you can find space to print these comments.

London, W.C.2. E. B. SAWYER,
Manager,
LIGHTING SERVICE BUREAU.

IN THE COURTS

IN the Queen's Bench Division of the High Court on 7th July the Lord Chief Justice, Lord Goddard, held that it is no part of the duty of an electricity supply undertaking, when inspecting and connecting extensions to an existing domestic installation, to carry out a test of the installation as a whole, unless specifically requested to do so by the consumer, who must be prepared to pay for that additional service. His Lordship added that it would be a sensible precaution for all with old installations in their houses to have them tested periodically.

The case was *Homer* v. *Southern Electricity Board*, in which the plaintiff sued the Board on behalf of his infant son for injuries received as a result of contact with the element of an electric fire in the living room of his home. The fire was plugged into a switch-socket, but was not switched on. The child had grasped the exposed element and had sustained burns to his hands, necessitating skin grafting. It was proved in evidence that the socket was wrongly connected, the live and neutral wires being reversed. The plaintiff alleged that, at some time previous to the accident, an employee of the Board, when connecting a new circuit for a washing machine, had been negligent in that he had reversed the polarity of the other heating circuits. It was further claimed that the Board's employee should have tested the whole of the installation, and not confined his attention to the new work.

Evidence was given on behalf of the Board to show that existing connections at the meter and at the consumer's main switch had not been interfered with by their employee, except so far as was necessary to incorporate the new circuit. A routine test of the polarity of one lighting circuit had been made both before and after doing the work, but the remaining circuits were not so tested.

His Lordship decided that the Board was not at fault, and he was satisfied that the reversal of connections to the fire socket, whether at the socket itself or at the fuseboard, had not been made by the Board's employee. The Court had not been given a satisfactory explanation of how the connections could have become reversed, and it might well be that they had been in that state ever since the installation was first put in many years ago. It would place an intolerable burden on the Board to hold that it was duty bound, every time the Board was asked to connect an extension, to test the other circuits as well.

Unsafe System of Work

In *Boyall* v. *British Thomson-Houston Co., Ltd.*, in the Queen's Bench Division on 9th July, Mr. Justice Streatfeild awarded the plaintiff, a skilled maintenance electrician employed by the defendant company, total damages of £1,298 as compensation for injuries received by him in an accident which occurred at the company's Willesden Works in March, 1951. The company was found to have been in breach both of its common law duty to provide and maintain a safe system of work, and of its statutory duty to provide a secure foothold for persons liable to fall more than ten feet, in accordance with Section 26 (2) of the Factories Act, 1937.

One of the plaintiff's duties was to maintain certain intercommunication circuits installed on the underside of the roof of No. 3 building, access to which could only be obtained by climbing on to a false ceiling over a passageway. This ceiling consisted of composition boarding laid on wood battens, and standing was provided by laying planks on top of the boarding in such a way that they were supported by the battens, whose position could be detected by nailheads. On the day of the accident the plaintiff and his mate were standing on one of these planks when, without warning, it tipped, broke through the ceiling, and caused them both to fall more than ten feet into the passage below. The mate was only slightly hurt, but the plaintiff sustained a compound fracture of the right leg, and injury to the left heel. He was away from work for over seven months, returned to light duty for another six months, and then resumed his previous employment.

It was argued for the company that the plaintiff had contributed to his accident by not taking sufficient care to see that the plank upon which he was standing was resting securely on the battens. He was a senior man of considerable intelligence, and must have known that there was a risk of the plank slipping; he should, therefore, have nailed it down, or asked someone else to do so. His Lordship refused to accept this, for any delegation of either common law or statutory duty by the employer must be most clearly expressed; and even when that has been done, it was for the employer to evolve the system of work and not leave it to the discretion of the employee. The company should have provided not only the planks, but also the means of making them safe, and they should have issued positive directions in regard to their use. In spite of there having been no previous accident with this existing and old-established system, the accident showed it to be a bad system, and the company was clearly at fault. There was no contributory negligence on the part of the plaintiff, who was therefore awarded agreed special damages of £298 for loss of wages, etc., and general damages of £1,000 for pain and suffering, which allowed for the unfortunate possibility of osteo-arthritis developing in the left heel at some future time.

COMMERCE and INDUSTRY

Strip Rolling Mill Order

Poplar Technical College Extension

AN order for electrical equipment for what will be the fastest mill in Great Britain for rolling tinplate strip has just been placed with the British Thomson-Houston Co., Ltd., Rugby. This is for the new plant at Velindre, near Swansea, of the Steel Company of Wales, Ltd. The electrical equipment will include six d.c. motors totalling 18,850 h.p. and specially designed for the application, two 8,000 kW motor-generators, and control gear of the latest type. The equipment will be used for driving a five-stand tandem cold rolling mill. This is an extremely high-production mill and at its top speed of 5,000 ft per minute can produce a coil of tinplate strip six miles long in six minutes. This is faster than the same company's similar mill at Trostre for which also B.T.H. supplied the electric drive. The consulting engineers for the electrical equipment are McLellan & Partners.

Poplar Technical College

Yesterday (Thursday) Mr. R. McKinnon Wood, chairman of the L.C.C. Education Committee, opened the new extension to the Poplar Technical College, a project which was started before the war, but which had to be built anew following a direct hit by a flying bomb in 1944. Mr. J. T. Bush, chairman of the governors of the College, presided.

The new building accommodates a heat treatment laboratory, a foundry, a motor vehicle shop, electric and gas welding installations, an elementary engineering science laboratory, an electrical installation room, drawing offices and lecture rooms.

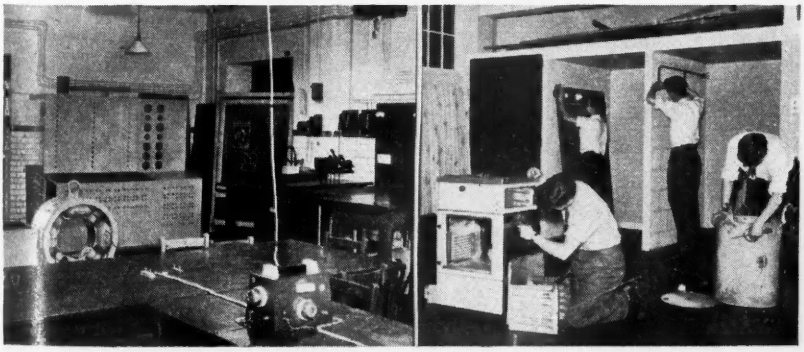
The College, of which Mr. W. Laws is the principal, provides full-time, part-time and evening courses in various branches of engineering, including electrical engineering, which embraces electrical installation and radio service work.

Educational Filmstrips

A series of twenty filmstrips, covering the two final years in the Ordinary National Certificate Course in Electrical Engineering, has been produced by Mullard, Ltd. Although prepared primarily for the assistance of lecturers and teachers in technical training establishments, many of the strips are suitable for senior science classes in grammar schools and for staff and apprentice training. In producing the filmstrips the company has had the advice and assistance of an advisory panel composed in the main of teachers in technical colleges. The strips were made and will be distributed by Unicorn Head Visual Aids, Ltd.

Teaching notes are provided with each strip, but no attempt has been made to produce "potted" text-books or to impose on the lecturer any preconceived method of exposition.

Part of the existing electrical engineering laboratory at Poplar Technical College and (right) a section of the electrical installation room in the new College extension



In general, the notes are confined to brief statements of the principles illustrated and to short descriptions of the apparatus shown.

The majority of the illustrations are either in the form of diagrams, graphs and the like, to illustrate principles and methods of construction, or drawings and photographs showing equipment under construction, examples of modern apparatus and typical installations. In selecting drawings and photographs of equipment, etc., the object has been to introduce to the student, at an early stage, the practical applications of the principles taught.

Safety in Ironfoundries

The Council of Ironfoundry Associations is taking further steps to promote accident prevention in the ironfounding industry, supplementing the work already done in encouraging more ironfounders to appoint joint safety committees in their works. It has now decided to appoint a Safety Committee. The appointment of the Committee has been delayed because the Council had to deal first with the Foundry Workers (Health and Safety) Bill and then the draft Iron and Steel Foundries Health and Safety Regulations which succeeded the Bill. The early introduction of these regulations by the Minister of Labour was indeed a condition upon which the Bill was withdrawn.

A committee of representatives of the constituent associations has been examining the regulations and the Council now considers that there should be a standing committee which can advise it and its member-firms on accident prevention matters.

Essex Agricultural Show

At the recent show of the Essex Agricultural Society one of the features was a comprehensive display of farming and domestic equipment by the Eastern Electricity Board, a section of which is shown in the accompanying picture. This display will be exhibited during the season at other agricultural shows in the Board's area.

Zinc Stock Disposal

The Ministry of Materials states that the stock of zinc remaining for disposal on 1st August is estimated at 64,000 tons. After the termination on 31st July of the provisional disposal plan, it is the Ministry's intention to sell zinc from its remaining stocks at a rate of 2,000 tons per month. This rate is to be compared with 4,000 tons per month plus sales by the Government broker under the present disposal arrangements. The new rate of disposal is subject to variation after consultation if in the view of the Government the situation so requires. Sales will normally be made by the Ministry to the agents of the producers and through other members of the London Metal Exchange. The Government broker will cease to operate after 31st July.

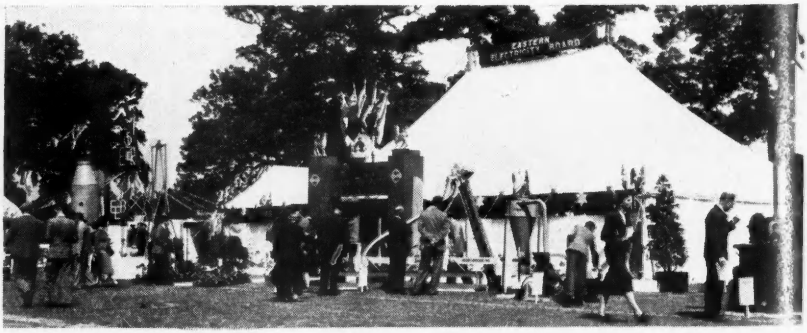
Illuminated Signs

A profusely illustrated brochure has been produced by the Electrical Sign Manufacturers' Association, Kingsway House, 103, Kingsway, London, W.C.2, with the title "The Case for Illuminated Signs." The matter takes the form of "statements" by well-known men in several spheres of activity who have various interests in the subject. The illustrations are largely day and night views of electric sign installations.

Turin Engineering Congress

The British Engineers' Association (32, Victoria Street, London, S.W.1) which represents United Kingdom interests on the organizing committee has sent us a copy of the preliminary programme of the Fifth International Mechanical Engineering Congress in Turin (9th–15th October next). The theme of the Congress is "Production and Assembly Methods for Com-

Part of the display by the Eastern Electricity Board at the Essex Agricultural Society's Show



Sales engineers who attended a recent conference held by the Rheostatic Co., Ltd. Seated, third from the left, is Mr. H. J. Gartside, chairman of the company

ponents in Mechanical Engineering." A number of technical papers will be presented and arrangements have been made for works visits.

Babcock & Wilcox in Japan

Further to previous reports of the formation of a new joint company in Japan taking the place of Toyo Babcock K.K., the new company, Babcock Hitachi Kabushiki Kaisha, has been established with the following address:—Tokiwabashi Office, 5, 2-Chome, Ote-machi, Chiyoda-ku, Tokyo.

Instrumentation Handbook

Coincident with the opening of the British Instrument Industries Exhibition held recently at Olympia, the British Industrial Measuring and Control Apparatus Manufacturers' Association published its first handbook. This 133-page illustrated publication deals with the achievements and potentialities of instrumentation and control in diverse industries and includes a list of members of the Association and a comprehensive guide to the sources of supply of all types of instruments and control apparatus.

B.O.T. Export Services Branch

The Industries Branch of the Board of Trade's Commercial Relations and Exports Department will move on 21st July to Lacon House, Theobalds Road, London, W.C.1 (telephone: Chancery 4411). At the same time, the title will be changed to Export Services Branch.

Sales Conferences

Main sessions at a sales conference held by George Kent, Ltd., at Luton on 29th June were devoted to a technical and commercial study of the new "KU" flow meter. Sales representatives, overseas branch company executives, and agents attended. Commander P. W. Kent, R.N. (Retd.), chairman and joint managing director of George Kent, Ltd., was in the chair at the conference, and the following countries were represented: Australia, South Africa, Malaya, France, Belgium, Holland, Ireland, Sweden and Austria, as well as all areas of the United Kingdom.

The accompanying picture shows sales engineers from various parts of the country who attended a sales conference held recently at Slough by the Rheostatic Co., Ltd. Discussions took place on the various aspects of automatic temperature control.

Large Signalling Scheme

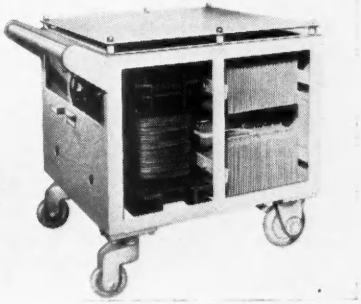
British Railways are to install a new electric colour light signalling scheme for Newcastle Central Station at a cost of £780,000. Construction will start at once and is expected to be completed within four years.

The work at four existing signal boxes with 538 levers and 34 switches is to be concentrated in a new electrically-operated signal box which will control 10 miles of track.

Heavy Duty Rectifiers

A batch of mobile rectifiers for installation at military aerodromes has recently been completed by Cayson Electrics, Ltd., Queen's Road, Watford, Herts. These heavy duty units are designed for easy transportation between hangars and are used in conjunction with l.v. air conditioning fans. They operate from 220 V three-phase 60 c/s mains and have a rectified output of 28 V 200 A. The transformer is

Cayson heavy duty mobile rectifier



double-wound air cooled to B.S.S. 171/1936, the primary being star connected and the secondary delta. Nine banks of parallel bridge connected selenium rectifiers are incorporated.

Prices of Materials

In the accompanying table we give the prices of the more important materials used in the electrical industry. The figures are those quoted on Monday last.

ALUMINIUM Ingots	ton £150 0s 0d
COPPER, H.C. Electro	ton £252 0s 0d
Fire Refined 99·70 per cent ..	ton £251 0s 0d
Fire Refined 99·50 per cent ..	ton £250 0s 0d
COPPER Tubes	lb 2s 4½d
Sheet	ton £305 10s 0d
H.C. wire and strip	ton £281 10s 0d
LEAD, English	ton £91 10s 0d
Foreign	ton £90 0s 0d
MERCURY	flask £70 10s 0d
TIN	ton £596 0s 0d
ZINC, G.O.B. Foreign	ton £72 10s 0d
Electrolytic	ton £72 0s 0d
BRASS Tubes	lb 1s 11½d
Sheet	ton £243 10s 0d
Wire	lb 2s 6½d
PHOSPHOR BRONZE	
Wire	lb 3s 9½d
RUBBER, No. 1 R.S.S. spot ..	lb 19½d–19⅝d

Trade Announcements

Bill Switchgear, Ltd., are opening a new branch at 2, Lovell Road, Leeds, under the management of Mr. N. Sharples.

Crown Fittings (Walsall), Ltd., has appointed Mr. L. M. Maynard, 13a, Gillingham Street, London, S.W.1 (telephone : Tate Gallery 2134), agent for "Crown" conduit fittings for London, Bedfordshire, Berks, Bucks, Essex, Herts, Hants, Kent and Surrey.

Porter Electrical Products, Ltd., Bramhope, Leeds, have appointed Lloyd's (M/C) Electrical Industries, Ltd., 2, Princess Street, Manchester, 1, as sole exporters for the "Portaway" earth-continuity system. Newey & Eyre, Ltd., Birmingham, have been appointed distributors in Warwickshire, Shropshire, Derbyshire, Worcester, and South Staffs.

Catalogues and Lists

G.B.M. (Electrical) Birmingham, 439, Moseley Road, Birmingham, 12.—Priced leaflet featuring the G.B.M. "Big Head" immersion heater.

Walter Logan & Co., Ltd., 26, Downing Court, Brunswick Square, London, W.C.1.—Illustrated catalogue featuring a range of "Hoffmeister" lighting fittings, including rise and fall (cord absorber) fittings, all-glass ceiling fittings and "Divilux" dimmer switches.

Antex, 3, Tower Hill, London, E.C.3.—Leaflet featuring the "Oryx" low-voltage soldering instrument.

Davis & Timmins, Ltd., Billet Road, Walthamstow, London, E.17.—Comprehensive price list of screws, nuts and washers (534) and a price list of rolled thread screws (RT.555).

Process Control Gear, Ltd., 56, Victoria Street, St. Albans, Herts.—Illustrated leaflets featuring a new range of domestic and industrial immersion thermostats.

Cowanite (Anti-Corrosive), Ltd., 15, Tithebarn Street, Liverpool, 2.—Leaflet dealing with "Cowanite" rust inhibitor and anti-corrosive preservative.

Berry's Electric, Ltd., Touchbutton House, Newman Street, London, W.1.—Illustrated priced leaflet on the recently introduced "Homeberry" imitation coal fire (B.1553).

Drubel Distributors, Ltd., 19-21, Stafford Road, Croydon, Surrey.—Catalogue on the "Fluoradisc" circular fluorescent fittings.

Gent & Co., Ltd., Faraday Works, Leicester.—Illustrated catalogue covering the company's range of synchronous mains-operated electric clocks (Book 5, Section 7f).

Revo Electric Co., Ltd., Tipton, Staffs.—20-page priced catalogue illustrating a comprehensive range of electric fans and fan regulators.

Standard Telephones & Cables, Ltd., Connaught House, Aldwych, London, W.C.2.—Six illustrated catalogues : individual relay units (D/RC26), 24-channel voice frequency telegraph system (C/2015), automatic battery charging control units (F/CU1), electronic telegraph distortion measuring equipment (C/TT15), electronic impulse frequency telemetering (D/RC11) and automatic power factor correction regulator for multi-stage capacitor switching (A/PF19).

New Day Electrical Accessories, Ltd., 136-8, Mary Street, Balsall Heath, Birmingham, 12.—Priced catalogue of "New Day" electrical accessories, switches, conduit boxes, etc. (GC/53/1).

Information Department

THE extensive records of our Information Department enable us to reply to most queries, but occasionally we ask our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

"Longford" fluorescent gear.

General inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by the Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Heat-Flow Problems

Their Solution by Electrical Analogy

In a paper on "The Solution of Transient Heat-Flow Problems by Analogous Electrical Networks," by D. I. Lawson, M.Sc., and J. H. McGuire, B.Sc., published by the Institution of Mechanical Engineers for written discussion, is described work undertaken to provide means for the rapid determination of the temperatures inside materials and composite structures when heated under conditions similar to those occurring in fires, by means of the electrical analogy of the heat conduction problems of the flow of electric current in series resistance, shunt capacity "networks." The apparatus used for the work was designed to give cathode-ray tube presentation of results for problems in which the boundary condition at the heated surface is a prescribed time-temperature curve.

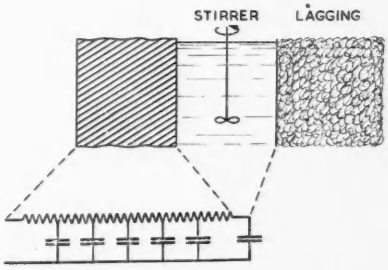
Consideration of the flow of heat in solids compared with the flow of charge in "transmission networks" commences with the following equations for the flow of heat in solids which are really basic to the whole paper:

$$\frac{\partial Q}{\partial t} = -K\delta y\delta z\frac{\partial \theta}{\partial x}$$

$$\frac{\partial}{\partial x}\left(\frac{\partial Q}{\partial t}\right) = -\rho S\delta y\delta z\frac{\partial \theta}{\partial t}$$

where the element or subject of heat flow has dimensions δx, δy and δz; and where $\partial Q/\partial t$ is the rate of flow of heat through area $\delta y\delta z$; θ is the temperature difference due to the heat flow in the x direction; K is the thermal conductivity; ρ is the density; S is the specific heat; and the negative signs indicate that the heat flow is considered to be positive in the direction in which θ is diminishing.

In the same section are deduced equations governing the flow of charge in a series resistance, shunt capacity



The heat subject and electrical analogy set-up for a thermally conducting medium in contact with a mass of well-stirred liquid

transmission line and for the analogy between the thermal and electrical problems, and in this connection the following tables are given.

The use of "transmission lines" to represent the flow of heat in cylinders and spheres is also considered here, it being noted that in the case of heat transmission in spheres the resistive and capacitative elements would vary with the square of the distance along the line.

In dealing with the design of suitable "transmission lines" to simulate heat-conduction problems the following primary constants representing uni-dimensional heat flow through a section of 1 sq cm of some common materials are of particular interest.

Table 1.—Analogous Thermal and Electrical Constants

Heat problem		Electrical problem	
Thermal conductivity × area	KA	Conductance per unit length of transmission line	$1/R$
Area × density × specific heat; that is, thermal capacity per unit length	$A\rho S$	Capacitance per unit length of transmission line	C

Table 2.—Analogous Thermal and Electrical Variables

Heat problem		Electrical problem	
Quantity of heat	Q	Quantity of electricity	q
Flow of heat	$\partial Q/\partial t$	Current	i
Temperature difference	θ	Potential difference across transmission line	v

At the same time consideration is given to the modification of the values of the primary constants required by altering the time scale of the electrical representation, and to iterated representations of the smooth transmission line.

In considering boundary conditions the authors treat a number of composite structures, each with its suitable electrical network, and we have selected for reference and illustration the case of a rear surface in contact with a limited quantity of well stirred liquid. The following simple relation will connect the rate of arrival of heat from the conducting medium dQ/dt with the rate of rise in temperature of the liquid $d\theta/dt$.

$$\frac{dQ}{dt} = \rho SV\frac{d\theta}{dx}$$

Table 3.—Primary Constants of Transmission Line
Uni-dimensional heat flow through unit area in common materials

Material	K, c.g.s. units	ρS, c.g.s. units	R, ohms	C, farads
Silver . . .	1·0	0·58	1·0	0·58
Steel . . .	0·11	0·93	9·0	0·93
Lead . . .	0·084	0·34	11·9	0·34
Limestone .	0·004	0·55	250	0·55
Spruce (with grain)	0·00055	0·12	1,820	0·12

In the electrical representation dQ/dt is represented by the current i at the end of the network, and $d\theta/dt$ is represented by a rate of rise in potential across the network dv/dt. Therefore the analogy will be satisfied if the liquid is represented by a capacity having a value ρSV. The network should therefore be closed by a condenser having a value ρSV. If the capacity elements in the rest of the network are scaled the same scaling factor will apply to this termination.

SOUTH AFRICAN NEWS

From Our Cape Town Correspondent

A SENIOR railway official in Cape Town said recently that it was hoped that by the end of August the main railway line would have been electrified as far as De Doorns. At present two electric trains a day do the return trip between Bellville and Worcester. By the end of June it was hoped that more engines would have arrived. The official said that until early difficulties had been overcome they would not increase speeds. They were still running to the steam engine schedules but pulling bigger loads.

The availability of an extra 20,000 kW in the peak hours each day from the Hex River power station, and the comparatively warm winter weather this year, had meant a comfortable margin of power in Cape Town, but the city electrical engineer said that there could be no guarantee against power cuts on a cold, wet night. He said there was as much as 25,000 kW difference in consumption on a fine night and a cold night, mainly because of radiators. The supply of coal for the power stations was now satisfactory; with 26,000 tons in reserve there was more than two weeks' supply. The consumption of coal—about 12,000 tons a week—was not greater than last year's because Cape Town was receiving better quality and better graded coal. In addition, coal was coming from only two or three mines instead of about 20. This meant greater efficiency as in the past different types of coal arriving during the day upset the setting of the boilers.

Pinelands will be the first area in the Cape Peninsula in which water heaters will be operated by remote control at peak hours. As the equipment has not yet arrived from overseas, however, the scheme will not be in operation until next winter. The Cape Town City Council plans in this way to avert power cuts at peak hours. Ripple injection plant will be installed at substations to transmit the operating signal. Later Plumstead and some other parts of the Cape Peninsula are to be brought under the same control. Controlled heating units would then be switched off between 5.45 and 6.45 p.m.

When the managing director of the English Electric Co. was in Johannesburg recently he said that his company had received from the South African and Rhodesian railways orders for some £4,000,000 of equipment, including eighty-three 2,000 h.p. electric and diesel-electric locos, and in addition orders worth about £1,750,000 were secured for turbo-alternator sets for Pretoria, Vierfontein and Rhodesian power stations.

Furthermore routine orders for transformers, switchgear, winders and other equipment for mining purposes were worth hundreds of thousands of pounds. He noted that there was an increasing demand in the Union for the smaller sizes of industrial electrical equipment, and because of this the company's Benoni, Transvaal, factory would be extended, and his additional capacity should be available during the current year.

Future of Television

Advisory Committee's Report

LAST week the Television Advisory Committee (chairman, Admiral Sir Charles Daniel, K.C.B., C.B.E., D.S.O.) appointed last year "to advise the Postmaster General on the development of television and sound broadcasting at frequencies above 30 Mc/s and related matters, including competitive television services and television for public showing in cinemas and elsewhere," published its first report which deals only with the first item in the terms of reference.

The relevant frequencies lie within the range 30 Mc/s to 3,000 Mc/s, i.e., the very-high frequencies (v.h.f.) 30 Mc/s to 300 Mc/s, and the ultra-high frequencies (u.h.f.) 300 Mc/s to 3,000 Mc/s. By international agreement three bands of v.h.f. and two bands of u.h.f. have been assigned to broadcasting, the v.h.f. bands being:—Band I, 41 to 68 Mc/s, Band II, 87·5 to 100 Mc/s, and Band III, 174 to 216 Mc/s. The u.h.f. bands are:—Band IV, 470 to 585 Mc/s and Band V, 610 to 960 Mc/s. From this it was clear that a technical examination of the available frequencies was essential, and the following recommendations are based on the work of a technical sub-committee which was set up for the purpose.

Colour Systems

The Committee assumes that the present B.B.C. 405-line system will continue to be employed, and considers that any colour system to be employed in the future should be compatible in the sense that the colour transmissions should be receivable in monochrome on receivers not designed for colour.

The channel width now in use for television in Band I is 5 Mc/s, except for channel I which is 6·75 Mc/s. This channel width cannot be altered and any colour system of the future for use in Band I will have to be contained in it. About 78 per cent of the population of the United Kingdom is able to receive the B.B.C.'s first television service by means of the high-power transmitters at Alexandra Palace, Sutton Coldfield, Holme Moss, Kirk o'Shotts and Wenvoe, and with the five additional medium-power transmitters already planned 90 to 95 per cent of the population will be served. These ten stations and two lower power stations in the Isle of Man and the Channel Islands will make virtually full use of the available frequency channels in Band I.

Allocation of Channels

While not ruling out some future integration of television and v.h.f. sound services in Band II it is proposed that this band should be left for the provision of additional sound services because it is too narrow to be of much use for television proper.

A 5 Mc/s channel width is recommended for Band III in the first instance, to make the greatest possible use of this band. At the Atlantic City Conference in 1947 most other countries allocated this band for broadcasting, but in the United Kingdom the part of the band between 174 and 200 Mc/s was allocated jointly to broadcasting and fixed services.

As regards Bands IV and V allocation is recommended in the first instance of every third 5 Mc/s channel, in order to provide against the possible advent of a colour system requiring a greater channel width. On a basis of 5 Mc/s channel width 93 channels could be provided in Bands IV and V. It is therefore recommended that allocations should commence with the lowest frequency channels in Band IV, and that, in order to avoid the need for rapid development of tunable adaptors to cover the very wide range, the first such allocation should not go beyond 700 Mc/s.

Data essential before any geographical distribution of television stations can be planned relate, in the first place, to the strength of the signal received at short distances from a transmitter of given characteristics, this determining the nominal

service area of the transmitter; and, in the second place, to signals received at much greater distances, this determining the separations that are required between transmitters working on the same or adjacent frequencies.

For frequencies in Band III data prepared and agreed by the International Radio Consultative Committee and used by the Stockholm Broadcasting Conference in 1952 have been adopted. There is, however, very little experimental information of the same kind available in Europe relating to frequencies in Bands IV and V, so that for planning in these bands use has been made of figures based on those published in the United States by the Federal Communications Commission.

Regarding television reception it is considered that the field strength of 300 μV/m put forward at Stockholm by the United Kingdom is too low and the Advisory Committee has therefore planned on the basis of a minimum field strength of 500 μV/m in Band III in order to reduce interference from extraneous sources.

New Leeds Railcars

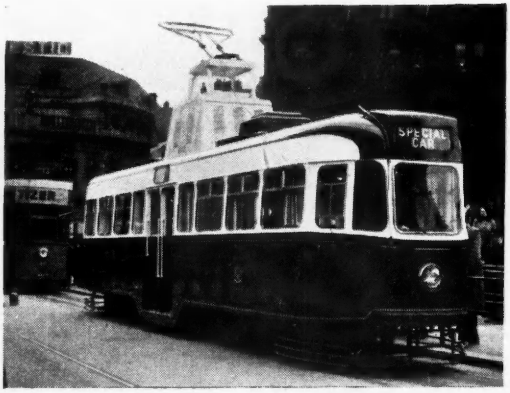
High-Speed Service for Outlying Areas

THE Leeds Corporation has decided that there is a future for single-deck railcars over special routes and on reserved tracks outside the city area. It is accepted that the orthodox tramcar no longer has a place in congested streets so the old double-decker will go in due course, together with most of the city tracks, and Leeds will have a high-speed railcar service to outlying areas.

The electrical traction equipment of the new railcars is a development of the Crompton Parkinson equipment on the Blackpool cars and includes "Vambac" (variable automatic multi-notch braking and accelerating control) gear; solenoid-operated internal expanding brakes operating on the motor shaft; magnetic track brakes; bogie-mounted motors with cardan shaft drive; and resilient wheels.

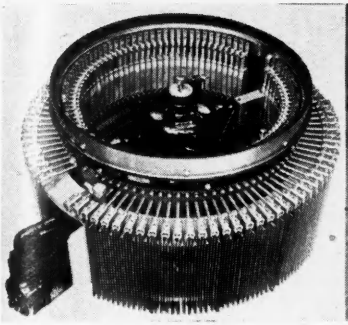
The main feature of the "Vambac" control system is the accelerator which reduces the control resistance during the accelerating period in very small steps so that acceleration is effected very smoothly. It has 83 steps instead of the six to twelve steps of the conventional type of controller, and also operates in reverse for rheostatic braking. This allows high rates of acceleration and deceleration without discomfort to passengers.

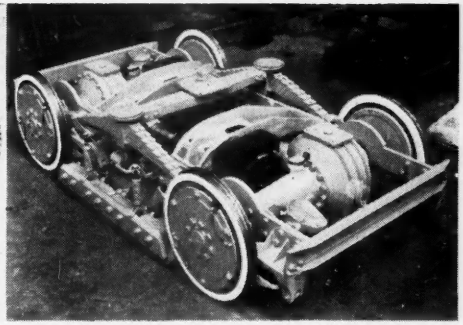
One of the new Leeds single-deck railcars



The resistors are switched by a motor-driven arm which is automatically regulated in speed according to the setting of the single driving lever, in conjunction with the control imposed by automatic safeguards to prevent overloading. The arm carries permanent magnets which operate the resistor step switches.

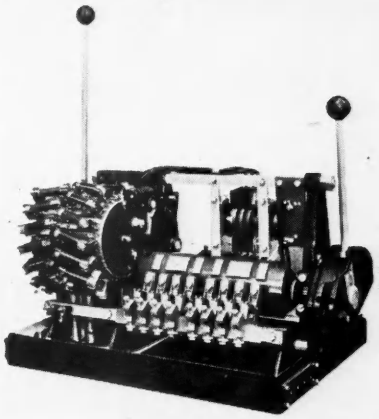
Both acceleration and braking are controlled by the car driving lever being pushed forwards or backwards respectively. Acceleration is automatic but the rate is





Above: **"Vambac" control system accelerator (left) and bogie incorporating two 45 h.p. motors**

Right: **Main driver's control unit**



variable as pre-selected by the driver, depending upon the extent to which the control lever is moved forward. With this arrangement the car automatically accelerates, at the rate selected, up to its full speed. The car is controlled by a single lever by the driver's left hand, on the right-hand side is another lever to operate a separate reversing switch.

The rheostatic braking is operative down to about three to five m.p.h., and braking from this speed to stop is effected by solenoid-operated internal-expanding brakes operating on the shafts of the motors. Magnetic track brakes are also fitted for emergency stopping. Both track and shaft brakes are battery operated and are thus independent of a supply failure. Indicating lamps are fitted in the driver's cab to show that all four shaft brakes are released and the track brakes applied on emergency stopping. In the event of a power failure, the vehicle is automatically brought to a standstill. To enable the conductor to switch off power and apply the shaft brakes in the event of an emergency, a suitable switch is provided in the central entrance of the car. The control gear was made by Allen West & Co., Ltd., in collaboration with Crompton Parkinson, Ltd.

There are four circular, round-frame, lightweight, high-speed motors of 45 h.p. mounted rigidly on the bogies, each driving through a cardan shaft. This allows the motor to be fully spring-borne, thus increasing the smooth riding of the car and the life of the equipment. The final drive is through a high-ratio reduction spiral bevel gearbox to the axle.

Maley & Taunton, Ltd., made the two bogies of 6ft wheelbase and 17ft centres. The wheels are of the resilient type in which there is no metal to metal connection between wheel hub and tyre, torque being transmitted and shocks absorbed by large masses of rubber in shear. The rubber is in the form of a "sandwich."

"Lighting the Way"

Since its formation in 1908, the Benjamin Electric, Ltd., has specialized in the production of industrial lighting fittings. The company has now issued a brochure, "Lighting the Way," briefly recording its history and showing some of the plant, research and technical facilities available.

ELECTRICITY SUPPLY

Jordan Water Power Scheme

Volta River Development

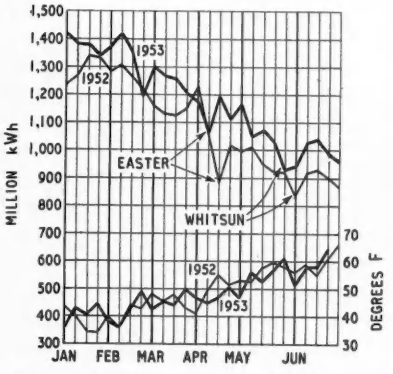
AN agreement was signed last week by representatives of the Jordan and Syrian Governments relating to a scheme for the development of the River Yarmuk, which is part of the frontier, for irrigation and power. The plan involves the erection of two hydro-electric stations and is expected to cost about £18 million.

Tariffs in the Merseyside Area

Equalization of electricity tariffs in the Merseyside area has been carried out too fast and too far states a report of the Merseyside Chambers of Commerce on electricity charges. The report makes the suggestion that there should be a technical advisory committee to review charges generally and that there is need for a review of generating charges.

Solid-Fuel-Fired Stations

In the Ministry of Fuel and Power's weekly statistical statement it is shown that 30,676 million kWh was sent out from solid-fuel-fired generating stations during the twenty-six weeks ended 3rd July last. This compares with 28,300 million kWh in the corresponding period of 1952. Coal stocks at electricity stations aggregated 5,008,000 tons at 27th June, equal to 5·5 weeks' supply, compared with 5,363,000 tons (6·6 weeks' supply) a year ago.



Weekly electricity output (solid-fuel-fired stations only) and average weekly temperature curves for the 26 weeks ended 4th July, 1952, and 3rd July, 1953

Electrical Maintenance Work

Haltwhistle (Northumberland) R.D.C. has issued a circular to its 300 Council house tenants stating that in future the tenants will be responsible for minor electrical repairs and for the replacement of electric bulbs. A proposal by the Council that only electricians approved by the local authority should be employed by the tenants to carry out repairs has been objected to, but the Council has adhered to its decision in order that equipment shall not be damaged by non-qualified persons.

Belfast Breakdown

The cause of failure of the electricity supply in Belfast and the surrounding area on 2nd July, during the visit of the Queen and the Duke of Edinburgh, is being investigated. At the request of Mr. R. P. Watson, the acting city electrical engineer, three switchgear specialists flew over from England to ascertain the cause of the breakdown, which will not be finally established until the whole casing and insulation has been stripped down on each side of the explosion point. The City Commissioner, Captain W. V. Millar, stated that after investigations he was satisfied that the stoppage was accidental.

School Heating

The Brighton Education Committee has considered a report from its Sites and Works Sub-Committee proposing the conversion of the existing electric thermal storage heating system at Patcham School to oil fired boilers, at a total estimated cost of £5,100, stating that it would effect an economy of approximately £1,190 per annum. The borough engineer and surveyor had reported that the present heating system was installed in 1937. The actual running cost of heating for 1951 was £1,966 for 673,313 kWh, plus £95 10s. for maintenance, etc., making a total expenditure of £2,061 10s. In 1952 the respective figures were £2,230, 677,004 kWh, and £95 10s. maintenance, totalling £2,325 10s. The cost of

conversion would be £5,100, the estimated annual cost of oil fuel £650, plus £50 for electricity for stoker motors. The borough engineer and surveyor was instructed to prepare drawings, etc., and to advertise for tenders. The Education Committee approved the proposals, which will have to be considered by the Brighton Council at its meeting at the end of this month.

Volta River Scheme

The Colonial Correspondent of *The Times* says that it is reported from Accra, Gold Coast, that the Prime Minister (Dr. Nkrumah) has announced a greater participation by the Gold Coast Government in the exploratory stage of the Volta River hydro-electric and aluminium scheme. A national committee is to be formed for the purpose and the Government intends to call in men of international repute as advisers on hydro-electric development, economics and finance. Acceptances have already been received from Dr. Arthur Morgan, the first chairman of the Tennessee Valley Authority, and Professor Arthur Lewis of Manchester University.

Tenbury Rural Extension

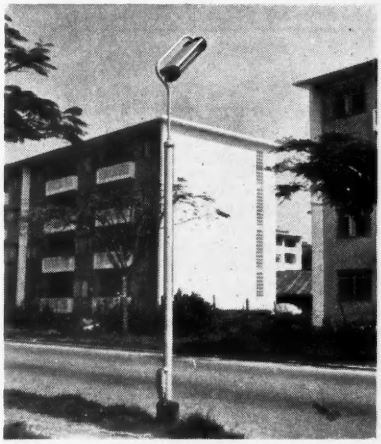
Stoke Bliss, Hanley William and Hanley Childe, parishes in the Tenbury Rural District Council's area, are to have a supply of electricity in 1955. This information was contained in a letter received from the manager of the Electricity Board's Ludlow office. It stated that a scheme had been approved which would bring electricity to some 94 farms, houses and cottages at Stoke Bliss, Hanley William and Hanley Childe. The proposals included 26 substations and high and low voltage lines at a cost of approximately £13,000.

Payment for Domestic Supplies

The Yorkshire Electricity Board has promised to investigate the demand for an easy-payment system for domestic electricity supplies following new arrangements for charges to be rendered quarterly, instead of fortnightly or monthly. A "savings" stamp scheme was suggested, but the Board said additional administrative costs would arise.

Singapore Street Lighting

Further installations of fluorescent street lighting have now been completed in Singapore following the original schemes carried out during 1951 in Shenton Way and Fullerton Road. For the new lighting B.T.H. equipment is again used. Lanterns of the SLC750 type, with 5ft lamps, are installed in Raffles Place and Collyer Quay, while SL3500 lanterns, which house 2ft fluorescent lamps, are installed in the Tiong Bahru area and Alexandra Road. More than 160 fluorescent lanterns are now in use in Singapore, as well as a considerable number of mercury vapour units.



B.T.H. 2ft fluorescent lantern outside one of Singapore's new blocks of flats

School Lighting

Durham County Education Committee is considering a £1,300 scheme for installing electric lighting at the Bishop Auckland St. Anne's C.E. (Controlled) School.

During the current year the Northumberland Education Committee is to spend £2,505 on installing electric lighting in nine schools.

Penrith Reinforcement

Cumberland County Council has approved plans by the North Western Electricity Board for an 11 kV line for the reinforcement of the electricity supply in the Penrith area.

New Turf Fired Power Station

As a result of further consultations with local people, the Irish Minister for Industry and Commerce, Mr. Lemass, has sanctioned the siting of a new turf fired generating station at Deelis Bridge, County Kerry.

Change-over at Huddersfield

Work has been carried out recently at Newsome preparatory to the eventual change-over to the standard voltage throughout Huddersfield.

Wash Boilers for Council Houses

All future Council houses in the Devizes rural district are to be equipped with electric wash boilers.

Financial Section

STOCKS and SHARES

DEFINITE news of the English Electric Company's plans for raising fresh capital is this week's principal event in the electrical equipment market. Apart otherwise from some local disturbances, due to individual company statements, the industrial markets have been somewhat lacking in incident. Gilt-edged stocks remained very firm, with British Electricity 4½ per cent stock up to 102; but in this market, also, animation was held in suspense by political developments abroad.

English Electric Capital

The prospectus appeared on Monday of this week inviting public subscriptions for £2½ million 4½ per cent debenture stock (redeemable 1972–77) in the English Electric Company, at 97½. Concurrently, the ordinary stockholders of the company are offered 1,769,365 new ordinary shares, in the proportion of one for every three old shares held, at 48s 6d. Together, the two issues will raise new money to the extent of a little over £6½ million. The continued expansion of the group's work has been accompanied, it is stated, by an increase of bank loans to over £12 million, which explains the need for the new permanent finance.

The Debenture Stock

Subscription lists for the new English Electric 4½ per cent debenture stock were due to open yesterday (Thursday). The price of 97½ was thought in advance to assure a big success for the issue, for there is evidence of a large demand in present-day circumstances for first-rate industrial stock giving a return something above that available from British Government securities, and repayable within a fixed term of years. On the terms of the offer, the yield on the debenture is £4 12s 4d per cent, plus a little more allowing for the 2½ points capital profit upon eventual repayment.

New Ordinary Shares

English Electric ordinary shares were marked down fairly sharply to 54s on the news of the coming offer, presumably in anticipation of the temporarily depressing influence exercised sometimes on these occasions by the selling of "rights." The value of the latter works out at about 1s 9d per share on the basis of the present price. The new shares will not qualify for the 5 per cent interim dividend just declared, but will thereafter rank equally with the old. Regarding prospects for the final dividend, the board considers that, in the normal course of events, profits this year should be ample to cover a payment of 10 per cent, as before, on the increased capital. Assuming a 15 per cent total, the new shares are offered on a prospective annual yield basis of £6 3s 9d per cent.

Metal Industries Results

Following a 15 per cent total dividend for 1951–52, the Metal Industries company gave a one-for-four share bonus, and, subsequently, paid an interim dividend of 4 per cent (the same rate as before) on the bigger capital. Despite a warning from the company at the time of the bonus distribution, the market had been banking fairly confidently on a similar decision on the final dividend. In the event, the latter is being reduced to 8 per cent, so that, in terms of money, the total of 12 per cent for the year gives stockholders practically the same as they received from the 15 per cent payment of the previous period. Disappointment was registered in a 4s drop in the price of the shares, to 41s. Trading profits are reported to have fallen, but the net figure after tax comes out a little higher.

British Thermostat Bonus

British Thermostat 5s ordinary shares at 16s 3d are now quoted ex the 100 per cent capital distribution, with the bonus shares a fraction higher by virtue of their being transferable free of the usual 2 per cent stamp duty. For last year, the dividend on the former capital was raised from 30 to 35 per cent. Should the rate be reduced this year in strict proportion to the increase in the nominal ordinary capital (now £320,000), the yield on the shares would be about 5·3 per cent, which is moderate enough to suggest hopes of something better in due course as a sequel to the capital bonus.

Price Changes

Brush Electric shares improved still further, and have already gained 1s this month, to 4s 3d. Crompton Parkinsons at 11s 3d also added to previous advances, motivated by last month's announcement of an increased interim dividend, and by the report of good current business. Plessey, at 25s, gained a further 2s. Rises in Decca and E.M.I. recognized the encouraging nature of the latest figures and plans for the television industry. Some of the cable manufacturers' shares turned to the easy side, but Chloride Electrics continued on the upgrade to 73s, and Westinghouse Brake have been well supported.

ELECTRICAL INVESTMENTS

Past Week's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price 13th July 1953	Week's Rise or Fall	Est. Yield p.c. £ s d
Gilt-edged and Overseas Stocks					
Brit. Elec. 1968/73	3	3	87½	—	3 8 6
Brit. Elec. 1974/77	3	3	86½	—	3 9 4
Brit. Elec. 1976/79	3½	3½	92	—	3 16 1
Brit. Elec. 1974/79	4¼	4¼	102	+½	4 3 4
Calcutta Elec. ..	6†	6†	19/6	—	6 3 0†
East African Power	7	7	23/-	+1/6	6 1 9
Nigerian Elec. ..	10	10	22/6	—	8 13 0
Palestine Elec. "A"	5†	Nil	10/6	−6d	Nil
Perak Hydro-Elec.	Nil	Nil	15/-	—	Nil
Equipment and Manufacturing					
AberdareCables(5/-)	20	25	16/-	—	7 16 4
Aerialite (1/-) ..	83½	88½	8/9	—	10 1 10
Allen, W. H. ..	15	15	46/3	—	6 9 9
Aron Elec. Ord. ..	15	20	47/6	—	8 8 6
Assoc. Elec. Ord. ..	20	20	73/9	—	5 8 6
Automatic Tel. & El.	15	15	56/3	—	5 6 8
Babcock & Wilcox	18	18	63/9	+6d	5 13 0
Baldwin, H. J. (2/-)	25	20	4/-	—	10 0 0
Bakelite (10/-) ..	—	12½	18/-	+1/-	6 19 0
British Aluminium	12	12	37/6	—	6 8 0
B.I. Callender's ..	9	10	35/-	−1/-	5 14 3
British Thermostat (5/-)	30	35	16/3	—	—
British Vac. Cleaner (5/-)	25	25	11/6	—	10 17 6
Brook Motors (10/-)	20	20	32/6	—	6 3 1
Brush Ord. (5/-) ..	10	4	4/3	+6d	—
A. F. Bulgin (1/-)	30	30	2/9	—	10 18 0
Burco (5/-) ..	38¾	35	17/6	—	10 0 0
Chloride El. Storage	15	20	73/-	+1/-	5 9 6
Cole, E. K. (5/-) ..	25	25*	17/3	—	7 5 0
Cossor, A. C. (5/-)..	Nil	10	8/9	—	5 14 3
Crabtree (10/-) ..	17½	17½	28/6	—	6 2 9
Crompton Parkinson Ord. (5/-) ..	11½	11½	11/3	+9d	5 0 0
De La Rue (5/-) ..	35	Nil	7/-	−6d	—
Decca (5/-) ..	112½	150	26/6	+9d	5 13 2*
Dewhurst (2/-) ..	22½	19*	5/6	—	6 18 3
Dictograph Tel.(2/-)	20	20	5/6	—	—
E.M.I. (10/-) ..	12	12	13/6	+6d	8 17 10
Electrical Components (5/-) ..	20	20	10/-	—	10 0 0
Elec. Construction	15	15	52/6	—	5 14 3
Enfield Cable Ord.	7½	5	20/6	—	4 17 6
English Electric ..	15	15	54/-	−3/-	5 11 1
Ericsson Tel. (5/-)	22†	22*†	37/-	—	2 19 6†
Ever Ready (5/-)	35	35	25/6	−6d	6 17 9
Falk Stadelmann	15	15	42/9	—	7 0 2
G.E.C. Ord. ..	22½	22½	40/9	—	5 10 5*
General Cables (5/-)	30	30	16/3	—	9 4 8
Greenwood & Batley	15	17½	40/-	—	8 15 0
Hackbridge Cable (5/-)	20	20	11/6	−6d	8 13 10
Hackbridge Hewittic (5/-)	20	20	17/-	—	5 17 8
Hall Tel. Acc.(10/-)	10	10	10/-	—	10 0 0
Heatrae (2/-) ..	12½	12½	4/-	—	6 5 0
Henleys (10/-) ..	20	10½*	16/3	−3d	6 9 3
Holophane (5/-) ..	15	20*	12/6	—	8 0 0
Hoover (5/-) ..	35	25	22/-	—	5 13 8
Equipment and Manufacturing (continued)					
Intl. Combustion (5/-)	25	15*	13/9	—	5 9 0
Johnson & Phillips	15	15	50/6	—	5 19 6
Lancashire Dynamo	12½	12½*	41/3	—	6 1 0
Laurence, Scott(5/-)	15	15	12/3	—	6 2 6
London Elec. Wire	12½	15	56/3	—	5 6 8
J. Lucas	7½	9½	38/-	+6d	4 16 6
Marryat & S. (2/-)	22½	22½	5/9	—	7 16 6
Mather & Platt ..	12½	15	48/6	—	6 3 9
Metal Industries ..	15	12*	41/-	−4/-	5 17 0
Mid. Elec. Mfg. ..	15	15	59/6	—	5 0 10
Murex	12½	15	58/-	+1/-	5 3 5
Newman Ind. (2/-)	10	10	2/3	—	8 17 9
Oldham & Son (1/-)	30	35	2/6	—	—
Parnall (Yate) (5/-)	6	6	2/10½	+1½d	10 8 6
Parsons, C. A. ..	10*	12½	65/-	—	3 17 0
Plessey (5/-) ..	22½	25	25/-	+1 6	5 0 0
Pye Deferred (5/-)	18	18	17/9	—	5 1 6
Revo (10/-) ..	27½	27½	46/6	—	5 18 3
Reyrolle	10*	12½	55/-	—	4 11 0
Scot. Cable (4/-) ..	32	20*	12/6	—	6 8 0
Siemens Ord. ..	10	10	32/6	−6d	6 3 0
Southern Areas ..	5	6	13/3	—	9 1 3
Strand Elec.(5/-)..	17½	17½	10/-	—	8 15 0
Sturtevant (5/-) ..	17½†	18·1*†	24/-	—	3 15 0†
Switchgear & Cowans (5/-)	22½	22½	14/-	—	8 0 9
Taylor. T. (5/-) ..	20	25	20/-	—	6 5 0
T.C.C. (10/-) ..	20	20*	35/-	—	—
T.C. & M... ..	10	8½*	28/-	—	6 1 5
Telephone Mfg.(5/-)	10	10	7/6	−9d	6 13 4
Thorn. Elec. (5/-)..	10	12½	10/6	—	5 19 0
Tube Investments	25	15*	56/6	+6d	5 6 3
Vactric (5/-) ..	Nil	Nil	5/-	—	Nil
Veritys (5/-) ..	7½	10	4/9	—	10 10 6
Walsall Conduits (4/-)	70	70*	44/6	—	6 5 10
Ward & Goldstone (5/-)	45	45*	35/-	—	6 8 7
Watford (2/-) ..	25	25	6/9	—	7 8 2
Westinghouse Brake	14	15	54/6	+6d	5 10 1
West, Allen (5/-) ..	15	15	11/3	—	6 13 4
Trusts, Transport and Communications					
Anglo-Am. Tel.: A Ord. ..	—	6	82½	—	7 5 5
Ord.	—	3¾	57½	—	6 10 5
Anglo-Portuguese	8	8	21/6	—	7 8 10
Brit. Elec. Traction: Def. Ord. ..	25	35	570	—	6 2 10
Cable & Wireless: Ord.	8	8	135	—	5 18 6
4% Loan ..	4	4	96	—	4 3 4
Calcutta Trams ..	6†	6†	22/6	—	5 6 8†
Cape Elec. Trams	5	5½	12/-	—	9 3 4
Marconi Marine ..	10	10	28/-	−6d	7 2 10
Oriental Tel. Ord.	16	16	67/6	—	—
Telephone Props.	8	8	95/-	—	—
Tele. Rentals (5/-)	10	10*	9/3	—	5 8 1

* After capital bonus. † Dividends are paid free of income tax.

The above quotations are based upon the middle prices given in the Stock Exchange Daily Official List.

REPORTS and DIVIDENDS

The English Electric Co., Ltd.—A sum of £6,568,000 is being raised by issues of ordinary shares and debenture stock. The debenture issue will consist of £2,500,000 4½ per cent debenture stock, 1972-77, which was to be offered to the public at the price of 97½ per cent. Application lists were to open and close yesterday (Thursday). Lazard Bros. & Co. are underwriting the offer and also the offer of 1,759,365 £1 ordinary shares, which will shortly be offered to ordinary stockholders at 48s 6d per share in the proportion of one new share for £3 of ordinary stock held. The new shares will not rank for the interim dividend of 5 per cent now declared, but when fully paid and converted into stock, will rank for any future ordinary dividend. The need for further permanent capital is due to rising output of both normal products and work for the defence programme. Although a large proportion of group profits has been retained in the business, increasing use has been made of bank facilities. At the beginning of this month bank borrowings by the group in the United Kingdom exceeded £12 million. The directors consider that under normal operating conditions profits for this year should be amply sufficient to cover a final dividend on the increased capital at the same rate as in 1952.

Marryat & Scott Holdings, Ltd.—The accounts for the year ended 31st March last show a consolidated trading profit of £140,170, as compared with £113,117 for 1951-52, and after deducting depreciation, etc., the net profit is £136,517 (against £109,088). Of this £91,154 is required for taxation, redemption reserve receives £3,500, and preliminary expenses written off are £4,674. The dividend for the year is maintained at 22½ per cent, and £47,814 is carried forward (against £26,150 brought in).

In his circulated statement, Mr. M. D. Scott (chairman and managing director) says that they achieved another record year both in the number of lifts built and in turnover. In February this year the whole of the share capital of Marris's Engineers, Ltd., Liverpool, was acquired for the further development of sales and service in the North of England. John Bennie, Ltd., in Scotland, had a successful year and Marryat & Place, Ltd., have increased the number and value of lift maintenance contracts in hand and have acquired premises in Bristol to develop their lift service in the western counties. While turnover of their companies reached new high levels and the present order book is satisfactory, a change to more competitive trading conditions became apparent at the end of 1952.

The Electric Construction Co., Ltd.—The accounts for the year ended 31st March last were reviewed in our issue of 3rd July. In his circulated statement, Mr. W. M. Furniss (chairman and managing director) says that the year under review shows a further increase in turnover and this increase should be maintained during the current year, as the new transformer shop is now in production. They have purchased a site for a factory in South Africa and they hope the building will be put up in about ten months' time. For the purpose of increasing the sale of their products in Canada, they are in course of forming a company which will be known as the Electric Construction Co. of England (Canadian), Ltd. They are meeting strong competition in all their export markets and this, coupled with currency restrictions, will create many problems.

Ward & Goldstone, Ltd.—The main figures in the accounts for the year ended 31st March last were given in our last week's issue. In his circulated statement, Mr. S. Goldstone (chairman and managing director) says that greater efficiency, modern machinery and teamwork have combined to produce an increase in earnings. Conditions in the last few months have become more difficult. In certain sections of the home trade there has been a noticeable recession, while in overseas markets the company is encountering severe Continental competition coupled with the imposition of various forms of credit restriction.

J. & F. Stone Lighting & Radio, Ltd.—The board announces that it is proposed to make a bonus issue of stock in the proportion of one new ordinary stock unit of 5s for every two ordinary stock units held. Subject to the consent of the Treasury being obtained, notice convening the meeting to pass the necessary resolution will be dispatched with the annual report and accounts which it is hoped will be in the hands of the stockholders in October next.

New Companies

Franklin & Freeman (Essex), Ltd.—Registered 20th June. Capital £100. Electrical, radio, radar, television, electric, mechanical and optical engineers, etc. Directors: A. Newman, 19, Rochester Gardens, Ilford; N. W. Newman, 209, Main Road, Gidea Park; and S. S. Newman, address not stated.

Consteliar Lighting, Ltd.—Registered 19th June. Capital £1,000. Manufacturers of and dealers in electric signs, advertising

appliances, etc. The first directors are to be appointed by the subscribers. Regd. office: 49, Hollywood Road, Kensington, S.W.5.

Unitelex (London), Ltd.—Registered 23rd June. Capital £500. Manufacturers and wholesalers of electrical equipment and fittings, including vacuum cleaners. Permanent directors: A. J. Garland and B. D. Garland. Secretary: A. J. Garland. Regd. office: Chesham House, Deptford Broadway, S.E.8.

S. J. Wheatley (Campden), Ltd.—Registered 4th July. Capital £1,500. Electricians, mechanical engineers and manufacturers, etc. Directors: S. J. Wheatley and Mrs. K. B. Wheatley. Regd. office: Lower High Street, Chipping Campden.

Burridge & Mathison, Ltd.—Registered 25th June. Capital £5,000. Electrical engineers and contractors, wireless, mechanical and general engineers. Directors: J. A. S. Burridge and K. Mathison. Solicitors: Rexworthy, Bonser & Wadkin, 83-5, Cowcross Street, E.C.

Gravesend & Northfleet Floodlight Sports, Ltd.—Registered 1st July. Capital £3,000. To undertake the floodlighting of sports and other grounds and buildings, etc. Directors: A. C. Norris-Telling, H. Merrison, A. E. Rothwell, F. Stevens, J. S. Rigg and J. Robbins. Regd. office: 11, Wrotham Road, Gravesend, Kent.

Industrial Electric (Shrewsbury), Ltd.—Registered 6th July. Capital £5,000. To acquire the business of an electrical and mechanical engineer carried on by Henry W. Young, at Shrewsbury, as H. W. Young. Directors: H. W. Young, Mrs. Mary E. Young, R. M. Young and R. H. Young. Regd. office: Glenburn Works, Monkmoor Road, Shrewsbury, Salop.

J. K. Ferris, Ltd.—Registered 2nd July. Capital £3,000. Electrical engineers and consultants, electrical wiring and installation contractors, manufacturers of and dealers in electrical apparatus, etc. Directors: J. K. Ferris and Mrs. Edith D. Ferris. Regd. office: 14, Queen Street, Blackpool.

Johnson's Of Allerton Road (Electrical), Ltd.—Registered 2nd July. Capital £500. Television and radio engineers, electricians, electrical engineers, etc. Directors: I. C. Jones, R. T. Jones, D. J. Crowe, F. C. Jones and H. Woodland. Regd. office: 81, High Street, Runcorn, Ches.

Liquidations

Northern Rhodesia Power Corporation, Ltd.—Winding up voluntarily. Liquidator, Mr. R. V. Pritchard, 11, Old Jewry, London, E.C.2, appointed 30th June. The liquidator is authorized, pursuant to section 287 of the Companies Act, 1948, to negotiate an agreement with the Rhodesia Congo Border Power Corporation, Ltd., and to carry the same into effect.

Midland Wireless & Electrical Appliance Co., Ltd.—Meeting of creditors on 27th July at the offices of Leeds Barlow & Co., to receive a statement of the assets and liabilities of the company by the liquidator, Mr. H. L. Barlow, pursuant to section 288 of the Companies Act, 1948.

Cedarcraft, Ltd., electrical contractors, 49, Church Street, Twickenham.—Claims by 27th July to the liquidator, Mr. S. Kriteman, 1, Quality Court, Chancery Lane, London, W.C.2.

Bankruptcies

J. D. Stuart, journeyman electrician, 22, Yarra Road, Cleethorpes.—Receiving order made 6th July on debtor's own petition.

L. J. Quick, electrical distributor, carrying on business at 2, The Mall, Ealing, W.5.—Proofs for dividend by 27th July to the trustee, Mr. R. A. Rodgers, 25, Bedford Row, W.C.1.

G. F. Jenkins, electrician, 24, Browning Road, Enfield.—Proofs for dividend by 25th July to the trustee, Mr. W. J. Wallis-Hill, 58-61, York Terrace, Regents Park, N.W.1.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 8th August:—

CASONIC. No. 714,909, Class 9. Piezo-electrical material made principally of ceramics for use as transducers.—Plessey Co., Ltd., 56, Vicarage Lane, Ilford.

EXTENSO. No. 715,213, Class 9. Electric distribution boxes incorporating fuses.—George H. Scholes & Co., Ltd., Wylex Works, Sharston Road, Wythenshawe, Manchester.

DUO-BASE. No. B715,562, Class 9. Electric switches, electric plug and socket connectors and parts of all such goods included in Class 9.—Ashley Accessories, Ltd., Morecambe Road, Ulverston, Lancs.

PENTACONTA. No. 716,001, Class 9. Telecommunication exchange systems and apparatus and parts thereof included in Class 9.—Standard Telephones & Cables, Ltd., Connaught House, 63, Aldwych, London, W.C.2.

WELISTOR. No. 716,930, Class 9. Electrical apparatus and instruments and parts included in Class 9 for all these goods.—Welwyn Electrical Laboratories, Ltd., Trading Estate, Bedlington Station, Northumberland.

MINSTREL. No. 717,689, Class 9. Radio, telephonic, television and telegraphic instruments, sound recording and sound reproducing instruments, and parts of all such goods included in Class 9.—Felgate Radio, Ltd., Felgate House, 6, Studland Street, London, W.6.

VESTA. No. 714,220, Class 11. Electric pressure cookers.—Easiwork, Ltd., 29, Goodge Street, London, W.1.

RAYDAIR. No. 715,604, Class 11. Electric radiators and electric convection heaters.—Berry's Electric, Ltd., 85 and 86, Newman Street, Oxford Street, London, W.1.

CORRIDOLUX. No. 717,290. CORRILUX. No. 717,291. Both Class 11. Lighting fittings and lighting installations.—Simplex Electric Co., Ltd., Broadwall, Oldbury, near Birmingham.

CONDITIONS IN JAPAN

Revival of Competitive Power

MUCH of general interest is contained in the report of Mr. N. S. Roberts, C.M.G., O.B.E., H.M. Minister (Commercial) at Tokyo, on economic and commercial conditions in Japan,* but from the electrical point of view the report is not so informative.

Dealing with Japanese competition, Mr. Roberts says that Japan won her outstanding position in the industrial field before the war by a combination of cheap labour and a relatively high degree of efficiency. She still possesses an almost unlimited supply of cheap labour, but she is now, except in the cotton textile industry and a few other industries which have been modernized by United States equipment, ten years behind the rest of the world in efficient technical processes. At November, 1951, the number employed in the electrical machinery, equipment and supplies industries was 160,367 of which 120,257 were males and 40,110 females.

Japan's steel industry had in 1951 reached an output of 6·5 million tons of steel ingots a year, compared with a wartime peak of 7·6 million tons. At the moment Japanese steel prices are appreciably higher than those of the United Kingdom.

Heavy Machinery Industry

In heavy machinery the country's competitiveness is considerable, especially because she can fit her export of capital goods into the various international plans for the development of backward areas. Her competitors are much occupied with defence orders at a time when Japan is almost entirely unencumbered in this respect. Railway rolling stock and locomotives, electrical generating equipment and diesel engines are three examples. Severe Japanese competition is to be expected in the machinery field, despite the fact that she is at present ten years out-of-date in many respects.

The post-war recovery in the machinery industry, particularly in the field of light machinery, has been rapid. Before the war the production of heavy machinery, such as rolling stock, hydro-electric equipment, marine engines and boilers, was in the hands of a few large concerns, and although some of these large concentrations have been dispersed, the present pattern is still very similar to that of pre-war years. The immediate post-war demands for the reconstruction of factories and facilities, with certain exceptions, provided manufacturers with full order books and with little ability to cater for export orders. By early 1950 local demands had been met to a great extent, and with the knowledge that American aid to Japan would soon be withdrawn the need for export orders became an urgent problem. Items in which Japan is likely to be competing again in world markets, particularly in the Far East, India and Pakistan, include certain types of electrical equipment and scientific instruments.

Hydro-Electric Development

Japan has developed her potentialities of hydro-electric power, so that for the size of the country the production of electrical energy is high. Since there are altogether some 1,500 plants, very few parts of the country are out of reach of electricity. Under the Anti-Monopoly Law enacted by the Japanese Government under the Occupation, the monopolistic Nippon Hassoden K.K. (Japan Generating and Transmission Co.), was split into nine regional companies in 1950. The total hydro-electric generation in 1951 was at the average rate of 3,131 million kWh a month.

Following the power shortage in the autumn of 1951 due to drought and the low level of coal stocks, the first stages of large scale development plans formulated by the Public Utilities Commission of the Japanese Government were put into execution for both hydro and thermal generation. Under a five-year plan (1952 to 1956) new hydro-electric development of 5·7 million kW is anticipated.

*H.M. Stationery Office, 4s 6d net.

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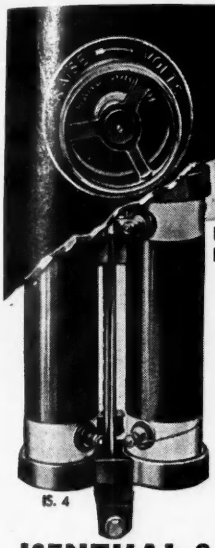

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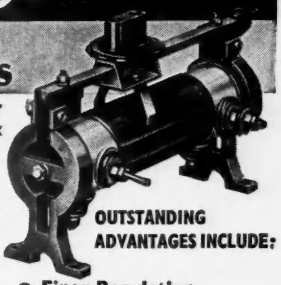

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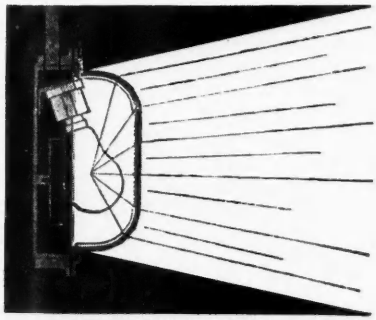

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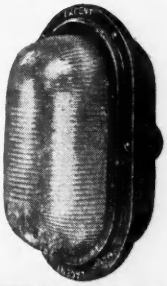

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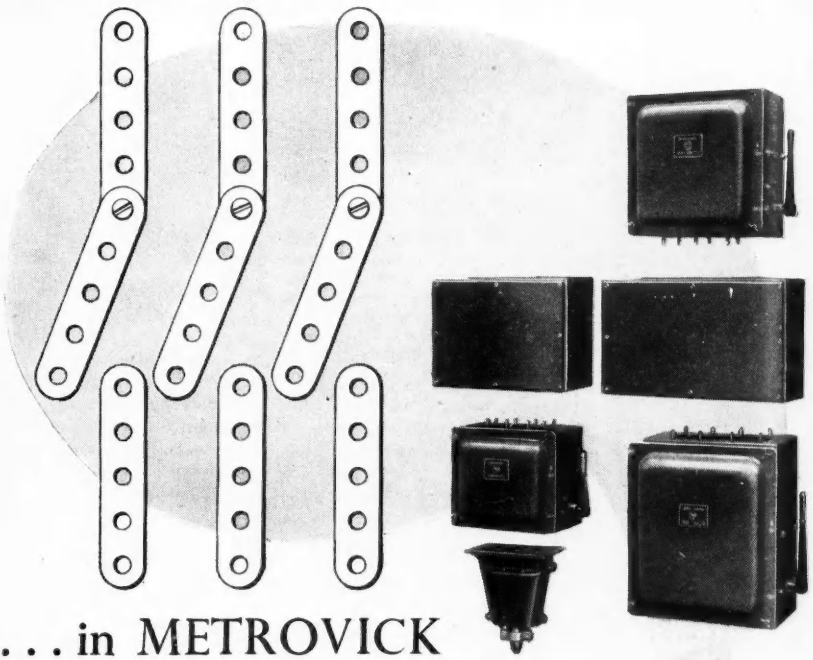

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NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 26th August from the Patent Office, 25, Southampton Buildings, W.C.2.

1947

30708. British Thomson-Houston Co., Ltd.—Methods of electrode activation. 19th November, 1947. (696056.)

1948

21483. Marconi's Wireless Telegraph Co., Ltd., and Bedford, L. H.—Television and like receivers. 29th July, 1949. (696121.)

1949

3282. Bidard, R., and Premillieu, G.—Separators for electric accumulators. 7th February, 1949. (696361.)

8474. Standard Telephones & Cables, Ltd.—Electric switches. 24th March, 1950. (696203.) 8475. Electric wiper switch contact banks and multiples therefor. 24th March, 1950. (696204.) 8476. Multi-contact electric switches and multiples therefor. 24th March, 1950. Addition to 651785. (696205.)

8710. Electric & Musical Industries, Ltd.—Electric control circuits. 20th March, 1950. (696362.)

9325. Ferranti, Ltd., and Jackson, H.—Pulse transmitting telemetering systems. 28th June, 1950. (696363.)

17298. Boulton Paul Aircraft, Ltd.—Electrical resistance networks for solving physical problems. 29th June, 1950. Addition to 605822. (696207.)

18501. Standard Telephones & Cables, Ltd.—Switches of the kind used in automatic telephony and multiples therefor. 7th July, 1950. (696208.)

18764. National Research Development Corporation.—Electron discharge tubes. 11th October, 1950. (696058.)

19978. Freeborn, A. G.—Method and apparatus for the electrical treatment of liquids. 26th June, 1950. (696060.)

26932. Simplex Electric Co., Ltd.—Electrically-heated appliances such as kettles, coffee percolators, irons and cooking utensils. 9th October, 1950. (696210.)

27010. Ministry of Supply.—Frequency-control arrangements. 12th October, 1950. (696120.)

27811. Langham, E. M., Bell, J., and Buckingham, J.—Apparatus for electrical resolution of vectors. 13th December, 1950. (696283.)

29103. Aluminium Bronze Co., Ltd., and Cleiff, J. A.—Power-driven wringers. 17th November, 1949. Divided out of 27329/48. (696124.)

32106. Metropolitan-Vickers Electrical Co., Ltd.—Electric gating circuits. 30th November, 1950. (696284.)

1950

1906. Electric & Musical Industries, Ltd.—Means for indicating the logarithmic value of a magnitude. 9th January, 1951. (696213.)

5868. Soc. Electrom.—Electromagnetic regulators for controlling the constants of an electric circuit. 8th March, 1950. (696065.)

8432. Voigt, P. G. A. H.—Magnets with annular gaps. 7th May, 1951. (696126.)

10153. Philips Electrical Industries, Ltd.—Magnetic materials. 25th April, 1950. (696216.)

10608. British Thomson-Houston Co., Ltd.—Thermosensitive devices and apparatus incorporating same. 1st May, 1950.

12109. Anglo-Iranian Oil Co., Ltd., and Riches, T. W. J.—Electrical heating apparatus. 13th April, 1951. (696128.)

14174. Tube Making Machines, Ltd.—Roller electrode-welding machines. 31st May, 1951. (696129.)

14412. Ashley Accessories, Ltd.—Lampholders for double ended electric lamps. 11th June, 1951. (696220.)

16721. Electric & Musical Industries, Ltd.—Apparatus comprising electrical resistance heating elements and electrical switches for use therefor. 4th July, 1951. (696070.)

19008. Dorman & Smith, Ltd.—Electromagnetic time delay tripping units. 13th July, 1951. (696221.)

19252. Parsons, Ltd., C. H., and Handley, G. B.—Socket units of plug-and-socket electric connectors. 19th July, 1951. (696372.)

19612. Elliott Bros. (London), Ltd.—Electrical circuits. 3rd August, 1951. (696222.)

22177. Babcock & Wilcox, Ltd.—Liquid-fuel burners. 8th September, 1950. (696072.) 23875. Cyclone furnaces. 29th September, 1950. (696295.)

24083. Cathodeon, Ltd.—Television pick-up tubes. 26th November, 1951. Addition to 688904. (696226.)

26866. Mullard Radio Valve Co., Ltd.—Cold-cathode electric discharge tubes. 16th October, 1951. (696077.)

27421. General Electric Co., Ltd., and Taylor, S.—Torsion spring arrangements in electric circuit breakers. 9th November, 1951. (696142.)

28117. Crabtree & Co., J. A.—Thermal overload devices for motor starting switches. 27th September, 1951. (696299.)

29482. General Electric Co., Ltd., Curtis, T. J., and Page, B. H.—Oscillatory electric fans. 26th November, 1951. (696382.)

29744. Soc. Anon. pour les Applications de l'Electricité et des Gaz Rares-Etablissements Claude-Paz & Silva.—Electric discharge apparatus. 5th December, 1950. (696082.)

30123. Babcock & Wilcox Co.—Circulation of cell electrolyte. 8th December, 1950. (696383.)

1951

1871. Weir Electrical Instrument Co., Ltd.—Float-operated electric switches. 29th November, 1951. (696240.)

1908. Hellermann Electric, Ltd.—Multiway seals or grommets for electric cables. 25th January, 1952. (696241.)

3428. Heenan & Froude, Ltd.—Electric dynamometers. 12th February, 1952. (696152.)

3526. British Electrical & Allied Industries Research Association.—Alternating current electrical bridge networks. 9th June, 1952. (696086.)

3693. British Thomson-Houston Co., Ltd.—Vacuum cleaners. 15th February, 1951. (696304.)

4937. M-O Valve Co., Ltd., and Willshaw, W. E.—Magnetron oscillators. 27th February, 1952. (696089.)

5476. Electric & Musical Industries, Ltd.—Television transmitting apparatus. 25th February, 1952. (696386.)

7013. Electrical Products (Colne), Ltd.—Stop-motions for drawing, gilling or other similar machines. 26th March, 1952. (696243.)

7459. Sangamo Weston, Ltd.—Temperature measuring apparatus. 30th March, 1951. (696155.)

7896. Westinghouse Electric International Co.—Cathode-ray tubes. 5th April, 1951. (696094.)

8541. British Thomson-Houston Co., Ltd.—Control systems for electric vehicles having eddy current brakes. 16th January, 1952. (696244.)

9797. Metropolitan-Vickers Electrical Co., Ltd.—Apparatus for inspecting fluorescent properties of materials. 11th January, 1952. (696098.)

11504. General Electric Co., Ltd., and Domville, A. R.—Micro-wave electrical attenuators. 16th May, 1952. (696393.)

11684. General Electric Co., Ltd., and Small, G. F.—Electric filter circuits. 12th May, 1952. (696394.)

11942. General Electric Co., Ltd., and Vernon-Smith, V.—Electronic modulators. 9th May, 1952. (696248.)

13153. General Motors Corporation.—Mounting of electric motors and the like. 4th June, 1951. (696104.)

13343. Filocamo, A.—Electrical automatic gear-changing apparatus. 5th June, 1951. (696106.)

13535. Philips Electrical Industries, Ltd.—Ferro-magnetic materials. 7th June, 1951. (696250.)

14156. General Electric Co., Ltd., and Flint, F. C.—Electronic apparatus. 13th June, 1952. (696328.)

14247. British Insulated Callender's Cables, Ltd.—Method and apparatus for detecting flaws in electric conductors. 13th June, 1952. (696251.)

14415. Syncro Machine Co.—Method and apparatus for annealing and drying wire. 18th June, 1951. (696330.)

14496. Standard Telephones & Cables, Ltd.—Electronic discharge tube. 19th June, 1951. (696109.)

14638. British Thomson-Houston Co., Ltd.—Electric circuit breaker units. 20th June, 1951. (696161.)

15069. Ceskoslovenske Zavody Tezkeho Strojirenstvi Narodni Podnik, and Houst, F.—Gas-blast electric circuit-breaker. 25th June, 1951. (696162.)

17880. Metropolitan-Vickers Electrical Co., Ltd.—Apparatus for measuring radiant heat. 30th May, 1952. (696255.)

17905. Schneider, E.—Electric light door switches. 27th July, 1951. (696256.)

18178. Mackereth, E. J.—Electrical transformer. 26th October, 1948. Divided out of 696201. (696257.)

18972. General Motors Corporation.—Manufacture of commutator bars. 13th August, 1951. (696338.)

19468. Siemens & Halske Akt.-Ges.—Arrangement for determining the black temperature and colour temperature of radiating bodies. 17th August, 1951. (696259.)

21089. Philco Corporation.—Deflecting and high-voltage supply circuit for cathode-ray tubes. 6th September, 1951. (696170.)

21182. Metropolitan-Vickers Electrical Co., Ltd.—Electrical distribution boards. 7th September, 1951. (696340.)

21651. Metropolitan-Vickers Electrical Co., Ltd.—Electrical distribution boards. 14th September, 1951. (696341.)

21652. Metropolitan-Vickers Electrical Co., Ltd.—Electrical distribution boards. 14th September, 1951. (696342.)

23579. British Thomson-Houston Co., Ltd.—Voltage regulators. 10th October, 1951. (696262.)

24034. Soc. Francaise de l'Electroresistance.—Watertight potentiometers. 15th October, 1951. Addition to 684067. (696263.)

24981. Hoover, Ltd.—Electric motor structures. 25th October, 1951. (696345.)

25058. Allmanna Svenska Elektriska Aktiebolaget.—Process for manufacturing divided wound magnetic cores for transformers and similar apparatus. 26th October, 1951. (696346.)

27523. Dictaphone Corporation.—Multiple speed electric motor drive systems. 23rd November, 1951. (696267.)

27774. Dictaphone Corporation.—Constant speed electric motor drive. 27th November, 1951. (696268.)

27861. General Motors Corporation.—Thermally-operated electric switch. 28th November, 1951. (696269.)

27998. Heinrich, D. O.—Two-stage electro-precipitators. 29th November, 1951. (696182.)

29849. Sihn, W. (trading as Firma Sihn, W., jun. Kommandit-Ges.).—Insulating supports or clamps for holding cables, wires and other electric conductors. 20th December, 1951. (696270.)

29913. Aluminium Francais.—Pylons for supporting electric cables. 20th December, 1951. (696184.)

29944. Westinghouse Electric International Co.—Rectified power equipment. 21st December, 1951. (696348.)

29958. Erie Resistor Corporation.—Construction of electric circuit components. 21st December, 1951. (696185.)

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1276. British Thomson-Houston Co., Ltd.—Luminescent materials and methods of preparing same. 16th January, 1952. (696188.)

1341. Vicars, Ltd., T. & T., and Naylor, J. F.—Electrically heated baking ovens. 17th January, 1952. (696352.)

8328. Schrier, J.—Holders for incandescent electric lamp bulbs. 1st April, 1952. (696195.)

9284. Felten & Guilleaume Carlswerk Akt.-Ges.—Electric cables. 10th April, 1952. (696196.)

9963. British Thomson-Houston Co., Ltd.—Automatic-washing machines. 21st April, 1952. (696119.)

10062. Union Carbide & Carbon Corporation.—Carbonaceous electrical contact brushes. 22nd April, 1952. (696199.)

10781. Landis & Gyr Akt.-Ges.—Alternating current measuring bridge. 29th April, 1952. (696277.)

12866. British Thomson-Houston Co., Ltd.—Machines for washing and drying dishes. 21st May, 1952. (696278.)

14291. Western Electric Co., Inc.—Multi-channel single side band radio transmission systems. 6th June, 1952. (696356.)

14585. Philips Electrical Industries, Ltd.—Electrical transformers. 10th June, 1952. (696359.)

14844. British Thomson-Houston Co., Ltd.—Quartz-to-metal seals. 12th June, 1952. (696360.)

U.S. Foreign Contracts

AMERICAN firms, increasingly worried over Government contracts going overseas, are urging employees to write to their congressmen about it because it "endangers their jobs." Mr. John Hodnette, vice-president in charge of the Westinghouse Electric Co.'s industrial products division, addressed a mass meeting of 8,000 employees at Pittsburgh. He said that since the beginning of 1952 the company's East Pittsburgh factory alone had lost "more than $7,000,000 worth of business and about a million man hours of work" on Government contracts given to foreign companies. On this business the United States Government had lost more than $1,800,000 in taxes, he said. The Government had let 24 contracts for electrical equipment to foreign companies in the last 18 months. The contracts were worth more than $13,500,000, representing 1,700,000 man hours of factory work lost to United States labour and representing $3,500,000 in lost taxes. "The equipment where foreign competition gives us a rough time is practically hand-made, which means wages usually make up half our cost," Mr. Hodnette added. The average earned hourly rate in manufacturing in the United States was about 174 cents and in the Westinghouse Company 210 cents. These rates compared with Switzerland 53 cents, England 43 cents, France 41 cents and Italy 31 cents.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Ardglass (County Down). — Electrical installation at St. Anne's Intermediate School. Tender forms from P. & B. Gregory, chartered architects, 25, Gresham Street, Belfast.

Australia. — BRISBANE. — 3rd September. Southern Electricity Authority of Queensland. Supply of protection relays. (C.R.E. 23271/53. Ten/6742.)* 8th September. Control panels. (C.R.E. 23272/53. Ten/6744.)*

Belfast.—28th August. City Council. Outdoor step-down transformer. (See this issue.)

6th August. Education Committee. Electric lighting installation in Currie Junior Primary School extensions, Cosgrave Street. Forms of tender, etc., from the Education Architect's Department, Academy Street.

Billericay.—29th July. U.D.C. Three centrifugal pumps driven by electric motors. Forms from Willcox, Raikes & Marshall, 33, Great Charles Street, Birmingham, 3.

Cowdenbeath.—29th August. Town Council. Street lighting improvements. (See this issue.)

Darlington.—20th August. Borough Council. Electrically driven 500 g.p.m. vertical spindle sludge pump for Stressholme sewage disposal works. Borough surveyor, Town Hall.

India.—AHMEDABAD.—27th July. Corporation. Supply of five pumping sets with electric motors. (C.R.E. 22344/53. Ten/6741.)*

London.—2nd November. Crown Agents for the Colonies. Transmission scheme for the Electricity Corporation of Nigeria. (See this issue.)

Middlesbrough. — Education Committee. Electrical installation at Kirby Secondary Grammar School. Education architect, Education Offices.

New Zealand. — AUCKLAND. — 3rd August. Auckland Electric Power Board. Supply of bare and insulated cable and wire. (C.R.E. 22532/53. Ten/6735.)*

WELLINGTON.—13th August. N. Z. Post Office. Supply of telephone cable. (C.R.E. 22560/53. Ten/6734.)*

27th October. State Hydro-Electric Department. Two three-phase 5,000 kVA 11 kV outdoor type oil-immersed current limiting reactors for Kaweran substation. (C.R.E. 23404/53. Ten/6750.)*

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Horse Guards Avenue, Whitehall, S.W.1 (Trafalgar 8855).

Peterborough.—25th July. City Council. Lighting and power installations in houses on the Dogsthorpe North estate. (See this issue.)

Southend-on-Sea.—27th July. Corporation. Electrical installation at Southchurch Hall High School. (See this issue.)

Stratford-on-Avon.—7th August. R.D.C. Electrically driven plant comprising three submersible borehole pumping units and three horizontal turbine pumping units, together with starters, wiring, control and metering equipment, etc., for pumping station at Thelsford. Forms from Willcox, Raikes & Marshall, 33, Great Charles Street, Birmingham, 3.

United States.—MOBILE (ALABAMA).—15th September. Corps of Engineers. Supply of a complete communication system (except antenna). (C.R.E. 22883/53. Ten/6743.)*

Uruguay. — MONTEVIDEO. — 11th August. Comision Aeropuerto Nacional de Canasco. Supply of a system for intercommunication at the National "Carrasco" Airport. (C.R.E. 23046/53. Ten/6739.)*

ORDERS PLACED

Brighton. — Education Committee. New wiring installation with distribution panel for electrical measurements laboratory, Technical College (£229).—H. J. Galliers, Ltd.

Hull. — Corporation Telephones Committee. Switchboards (£4,638).—Telephone Manufacturing Co., Ltd.

London.—L.C.C. Electrical installation at Rotherhithe Primary School, Bermondsey (£2,842).—Fullick & Loosley, Ltd. Electrical installation at Sellincourt Primary School, Wandsworth (£3,490).—H. A. Lamb & Sons, Ltd.

Luton.—Corporation Housing and Estates Committee. Electrical installations in "Cornish Unit" type houses being erected on the Westmorland Avenue Estate (£3,314). — Scientific Electrical Services, Ltd.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Birmingham.—Dwellings (4,771), as house building programme for 1954. Dwellings (169), in Morville Street-Essington Street redevelopment areas; H. J. Manzoni, city engineer.

Erection of Bourneville Boys' Technical School for E.C.; W. J. Whittall & Sons, Ltd., 132,

Lancaster Street, Birmingham. Bromford Primary Junior School; T. Lowe & Sons, Ltd., Cherry Street, Birmingham. Hawkesley Farm Primary and Infants' Schools; F. Deeley, Ltd., 210, High Street, Harborne.

Blackburn.—Bus station, Blakewater site (£30,000); city engineer.

Bolton.—Foundry; Boyes Bros., Maze Street Works.

Brighton.—Houses (186), Woodingdean estate; borough engineer.

Carlisle.—Eight shops and flats at Harraby; city engineer, 18, Fisher Street.
R.C. Church at Harraby; W. C. Mangan, architect, 2, Ribblesdale Place, Preston.

Cheltenham.—Houses (24), Oldfield Court estate; Rainger, Rogers & Smithson, architects to T.C., 29, Rodney Road.

Chesham.—Houses (16), in pairs, at Fullers Hill; L. C. Powell, architect to U.D.C., Norfolk House, Station Road, Chesham, Bucks.

Chingford.—Houses (24), Goomes Farm estate; borough engineer.

Cleethorpes.—Two blocks of lock-up shops with flats over (three-storey development) at Beacon Hill; A. B. Cooper, borough surveyor, Council House.

Croydon.—Factory, New Addington Industrial estate; Diac, Ltd., 49a, South End.
Dwellings (150), Addington; R. Mansell, Ltd., 17, Grant Road.

Darlington.—First stage of proposed college of further education for the E.C.; borough architect, Central Buildings.

Dewsbury.—Works extensions; British Waste (Fibres), Ltd., Hebble Mills.

Diss.—Houses (48); A. F. Scott & Sons, architects, 23, Tombland, Norwich.

Dorchester.—Houses (90), and bungalows for old people (12), Poundbury estate; borough surveyor.

Eccles.—Dwellings: 102 (Contract A), 146 (Contract B) and 58 (Contract C), on the Brookhouse estate; borough surveyor, Town Hall Annexe, Irwell Place.

Essex.—Junior school, Great Baddow, junior school, Brentwood, and two junior-infants' schools at Harlow; H. Conolly, county architect, County Hall, Chelmsford.

Exeter.—Health centre at Whipton; city architect, Southernhay West.

Fenstanton.—Houses (30) for St. Ives (Hunts) R.D.C.; council architect, St. Ives.

Gateshead-on-Tyne.—Works extensions; Huwood Mining Co., Ltd., Trading Estate.

Heckmondwike.—Extensions at Croft Mills, for Ridings Mfg. Co., Ltd.; Walker & Liley, architects, Albion Chambers, Cleckheaton.

Hucknall.—Erection of Ruffs Farm Secondary Modern School for C.C.; J. W. Stamp & Co., Ltd., Bobbers Hill, Nottingham.

Huyton.—Factory for Huntley & Palmer, Ltd.; North Western Industrial Estates, Chapel Street, Liverpool.

Lancashire.—Secondary modern schools at Leyland, Lytham St. Annes, Great Crosby, Middleton Langley and Droylesden; county architect, County Offices, Preston.

Lincoln.—Block of shops with maisonettes over, on the Riseholme estate; city architect, Stamp End.

London.—HOLBORN.—Multi-storey office building on site in Hatton Garden (£70,000); London Diamond Exchange.
MAYFAIR.—Showrooms and offices, New Burlington Street and Savile Row; John Heathcoat & Co., Ltd., 33, Margaret Street, W.1.
ROTHERHITHE.—Dwellings (128), Linsey Street and Moodkee Street; borough engineer, Spa Road.

Maidstone.—Houses (92), Peel Hedges estate; A. J. Townsend & Co., Ltd., Woodlands Close, Benenden Heath.

Manchester.—Houses at Langley estate for T.C.: 124, W. Hodgkinson, Ltd., Buxton; 120, A. Wallwork, Ltd., Stretford; 98, F. Gannon & Sons, Ltd., Manchester; 96, Poole & Foster, Ltd., Manchester; 148, T. Costello, Ltd., Stockport; 241, Simms, Sons & Cooke, Ltd., Nottingham.
New buildings at Irwell Wharf for Ship Canal Co., Ltd.; Wm. Thorpe & Sons, Ltd., Trafford Park.

Newcastle-on-Tyne.—New shopping centre from St. Mary's Place to New Bridge Street for the City Council; city architect, 18, Cloth Market.
Conversion of nurses' home at Walkergate Hospital into headquarters for staff of Newcastle Hospital Board, "Dunira," Osborne Road, Newcastle-on-Tyne; Board's chief architect.

North Shields.—Factory at Howdon Road for Houseman & Thompson, Ltd., Jesmond Road, Newcastle-on-Tyne.

Nottingham.—Further 96 houses at Wollaton Vale, Fernwood estate; Thomas Bow, 45, Lamartine Street.

Rochdale.—Houses (306), Kirkholt estate; Roy & Partners, Ltd., 25, Cross Street, Manchester.

Romford.—Factory, Farringdon Avenue; G. M. Blouses, Ltd., 377, Queens Road, E.13.

Sandy (Beds).—Secondary modern school; county architect, Shire Hall, Bedford.

Sheffield.—Factory, offices, etc., in the Scotland Street area; H. Barringham, Ltd., manufacturing confectioners, Pitsmoor Road, 3.
Conversion of old cinema, London Road, into dance hall; Mecca, Ltd.

Sturry (Kent).—Houses (34), on the Broad Oak site, for Bridge-Blean R.D.C.; H. V. Godfrey, architect, 63, Oxford Street, Whitstable.

Sunderland.—Works extensions; Thomas Reed & Co., Ltd., 184, High Street West.
Houses (1,259) at Grindon Village for the T.C.; borough architect, Grange House, Stockton Road.

Taunton.—Adaptations, etc., at Hestercombe House to form county fire service headquarters; R. O. Harris, Somerset county architect, Park Street Offices.

Warwick.—New residential nursery for 32 children and 14 staff at Myton Hamlet (£41,000); county architect.

Wellingborough.—Houses (112), on the Croyland Hall Farm Estate; R. Kilby, U.D.C. surveyor, Council Offices, Swanspool House.